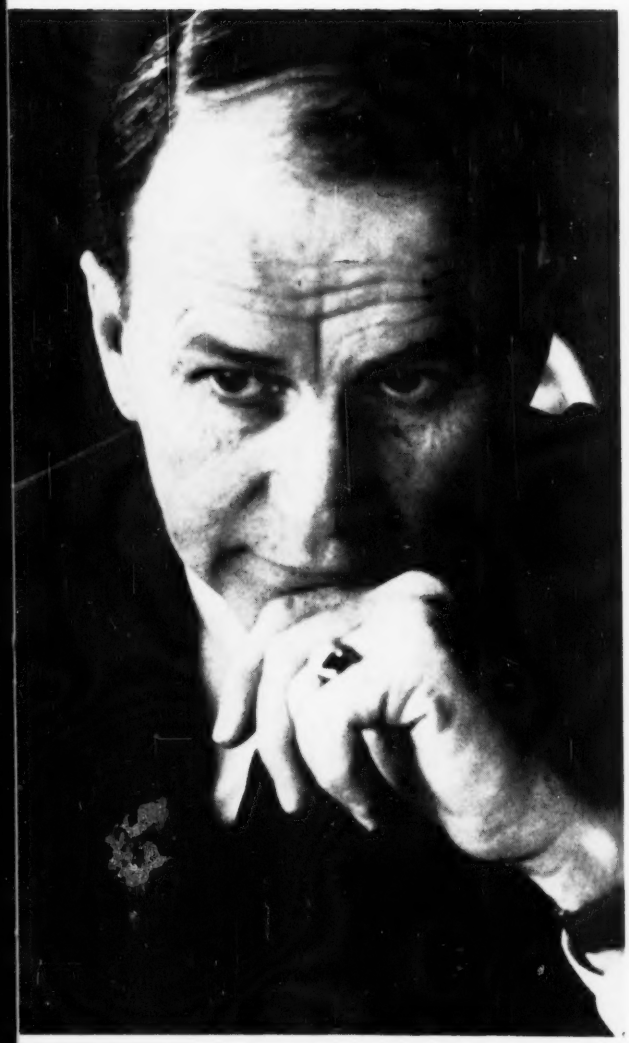
A McGRAW-HILL PUBLICATION

Chemical Week



This week in missile chemicals. Demand, competition both spurt—but incentives lag . p. 21

ADL's Gavin alerts CPI to commercial profit potential of missile research . . . . p. 32

New paints mean trouble for paint strippers. How formulators are coping . . . . . p. 49

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Local rule for foreign plants is Cyanamid's key to efficient overseas management . p. 84

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January 24, 1959

Scrub Carbon Dioxide from Process Gases

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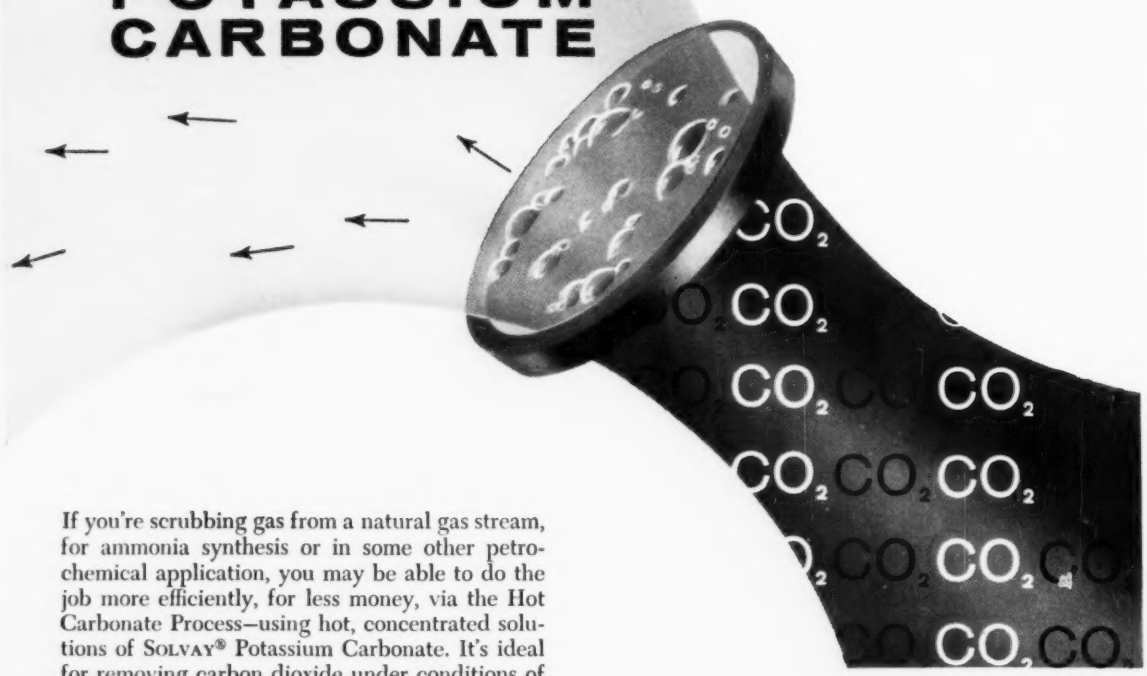

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Chemical Week

TOP OF THE WEEK **JANUARY 24, 1959**

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- **Minnesota Mining's big billboard promotion plan** puts company, products on nation's highways .....**p. 41**
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22 Freeport Sulphur asks Canada to bar export of "sour" natural gas, pending studies of sulfur markets, conservation methods.

23 England's Imperial Chemical Industries, largest private chemical producer outside U.S., sets up $280-million expansion program. Target: bigger export sales.

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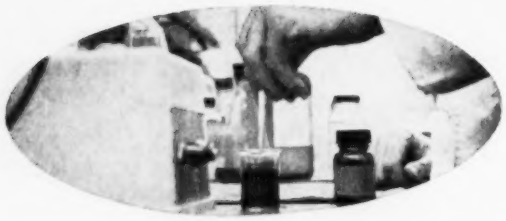

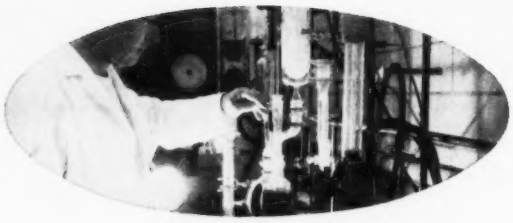

A look at today . . . and a glimpse

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Armour's quaternary ammonium chlorides are among the most versatile of all Armour Chemicals. They can be formulated to be water soluble, oil soluble or water dispersible. The Arquads give you exceptional flexibility in devising new products, new processes, and new formula variations.

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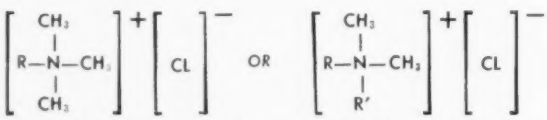


Mono-Alkyl Trimethylammonium Chloride

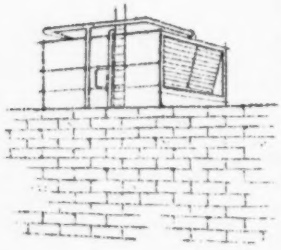
Dialkyl Dimethylammonium Chloride

"R" represents fatty acid derived long chain hydrocarbon

Where the Arquads work today

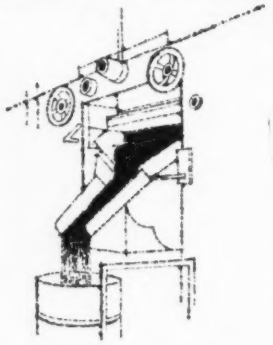
Fabric softeners: Unique properties are being imparted to textiles today by Arquad 2HT (dimethyl distearyl quaternary ammonium chloride). This Armour Chemical softens, sanitizes, permits faster drying, eliminates static electricity, speeds up ironing. It is compatible with starches, dextrins, glue, gelatin and the polyvinyl acetate and/or chloride emulsions. *For more data check "A" in the coupon.*

Liquid starches: Arquads are reducing and stabilizing the viscosity of liquid starches immediately after manufacturing and during storage. These chemicals also inhibit microorganisms, act as preservatives, increase the uniform deposition of the starch onto paper or fabric, and lubricate the dry starch film during ironing or calendering. *Additional information is available. Check "B" in the coupon.*



Industrial cooling systems: Slime, algae and fungi found in cooling towers and water conditioning systems are being inhibited by the Arquads at concentrations of 25 to 100 parts per million. These chemicals have been found to be highly effective against bacteria found in water systems. *Get more information. Check "C" in the coupon.*

Latex foam rubber: Large scale production of latex foam rubber is being made easier because of Arquad 12. This Arquad is an efficient and economical gel sensitizer and processing aid in foam rubber made from natural rubber latex or blends of natural and GR-S (butadiene-styrene) latices. It is nonstaining, increases gel strength and foam volume, reduces shrinkage—and is low priced. *For more complete information, check "D" in coupon.*



Pigment dispersion: Arquad 2C used with Ethomeen® S/12 (an ethoxylated amine) exhibits excellent pigment dispersing properties. It may be applied during preparation of the pigment in an aqueous system or during grinding of the pigment in oils. *Interested in this application? Check "E" in the coupon.*

Stability and compatibility

Arquads are stable over a wide pH range. The alkyl trimethyl derivatives are insensitive to the presence of low concentrations of water soluble salts, and are not precipitated by hard water. The dialkyl dimethyl quaternaries, however, are somewhat more sensitive to precipitation by di- or tri-valent salts.

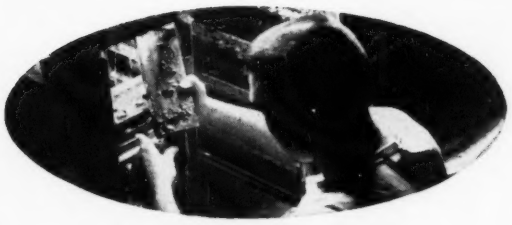
Arquads, being cationic surfactants, are not compatible with anionic materials such as soaps or common synthetic detergents.

Surface tension

Dynes/cm @ 25°C. Concentration—0.1%	
Water (as reference)	73
Arquad 12	33
Arquad 16	34
Arquad 18	34
Arquad C	31
Arquad S	34
Arquad 2C	30
Arquad 2HT	37

Solubility data

In the Arquad series, the mono-alkyl quaternaries are water soluble. The dialkyl quaternaries (Arquad



# of tomorrow

from Armour Chemical

2HT and 2C) are soluble in most hydrocarbons and a variety of organic solvents.

In water. Most of the mono-alkyl trimethylammonium chlorides are soluble in water at room temperatures over a relatively wide concentration range. Arquad 18 (the octadecyl quaternary), however, is soluble in water only at temperatures above 31°C.

The dialkyl dimethylammonium chlorides are essentially insoluble in water, although they may be readily dispersible. Stable dispersions of Arquad 2HT at a concentration below 7.5% (by weight of quaternary) in water can be consistently obtained.

In organic solvents. All of the Arquads are true salts, and tend toward insolubility in non-polar and slightly polar solvents. Exception is the solubility of these Arquads in chloroform and carbon tetrachloride.

The dialkyl dimethylammonium chlorides are more soluble in non-polar and slightly polar solvents than their alkyl trimethylammonium chloride counterparts. This property is the function of the second long chain radical.

Where the Arquads will work tomorrow

Extensive research and field testing is being conducted on the various Arquads in some of the following typical applications: flocculating aids in water clarification systems; cationic emulsifiers in asphalts; antimicrobial protection in cutting oils. Look to Armour for future announcements on these developmental projects.

Test and evaluate the Arquads. Find out how they can improve one of your finished products, solve a processing problem, or perhaps help bring out a new product. Armour's chemical specialists will help you determine the correct Arquad for your specific application. Send coupon or call today.

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NEWS NOTES

Amsterdam, Holland. *The Staatendam*, Holland-America's new liner on the North Atlantic run uses 0.2 to 0.3% of Arquad 18-50 to eliminate static electricity in rubber floor coverings. The quaternary ammonium chloride used was produced by the London facilities of Armour Chemical, Ltd.

•

Chicago. Armour has realigned its sales organization into 2 segments: Chemical Derivatives; and Fatty Acids/Industrial Oils. This change will improve customer service to meet the diverse needs of the chemical industry.

•

New York. Manufacturers of fiberglas reinforced resin moldings are eliminating static electricity in the handling of the fiberglas rovings. An Armour quaternary, Arquad 12, is applied to the glass fibers during processing. Its use makes possible speedier and easier production of boat shells, chairs, skis, wall panels, and a host of other finished items.

•

Washington. A patent was issued to Armour for an improved lime buffing composition comprising 65-80% Vienna lime, 12-18% of a saturated fatty acid having a titer of at least 40°C, 12-18% tallow and 1.5-5.0% of an N—alkyl trimethylene diamine, e.g. Duomeen® T.

•

Chicago. A new Pigment Dispersion booklet has been recently published. Included are sections on Paints, Plastics and Rubber. It's available through Armour Chemical.

How can the Arquads help you?

Check here for more information on your field of interest.

☐ A ☐ B ☐ C ☐ D ☐ E

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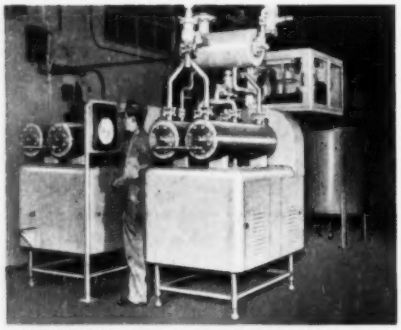
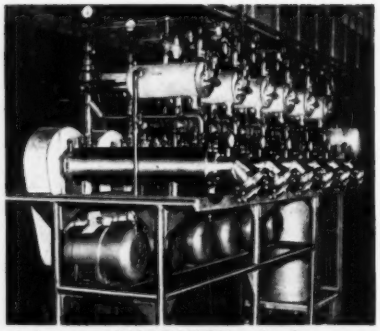


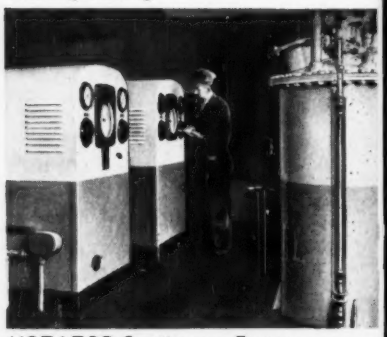
VOTATOR Continuous Processing Equipment used for production of industrial starch.

Chilling and Extruding



A battery of VOTATOR units for processing gelatin and glue.

Heating, Cooling, Jelling and Homogenizing



VOTATOR Continuous Process Equipment plays an important role in lubricating grease production.

Mass markets cannot be captured without mass production, mass production that reduces costs to protect profits. As a result, continuous processing has become widespread in the rapidly expanding chemical industry, and VOTATOR Continuous Process Equipment is often the way to increase production, to lower costs, to better profits and to improve product quality.

VOTATOR Continuous Process Equipment brings automation to processing. Designed for controlling many highly exothermic reactions, VOTATOR Continuous Reactors permit handling of those reactions which evolve considerable quantities of heat as well as those end products which are either exceedingly viscous or result in a product which has a tendency to foul a heat exchange surface.

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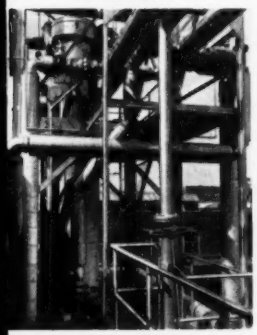
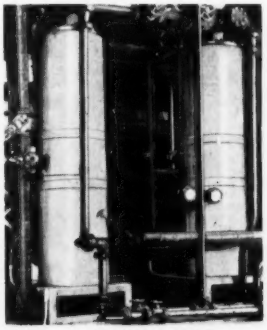
Polymerizing and Cooling



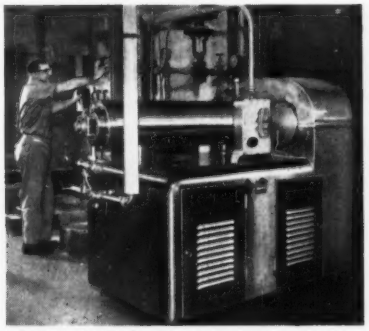
Outdoor installation of VOTATOR equipment for processing resins.

Crystallizing



Heavy duty VOTATOR Reactors used for large volume production of sodium chlorate.

Emulsifying and Cooling



VOTATOR Reactor for continuous processing of cosmetics.

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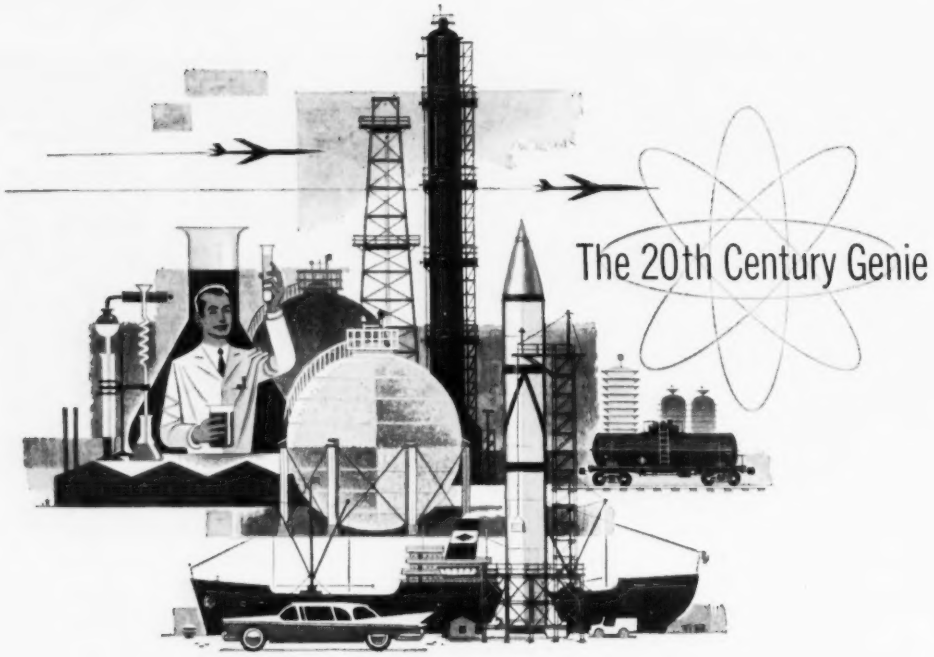

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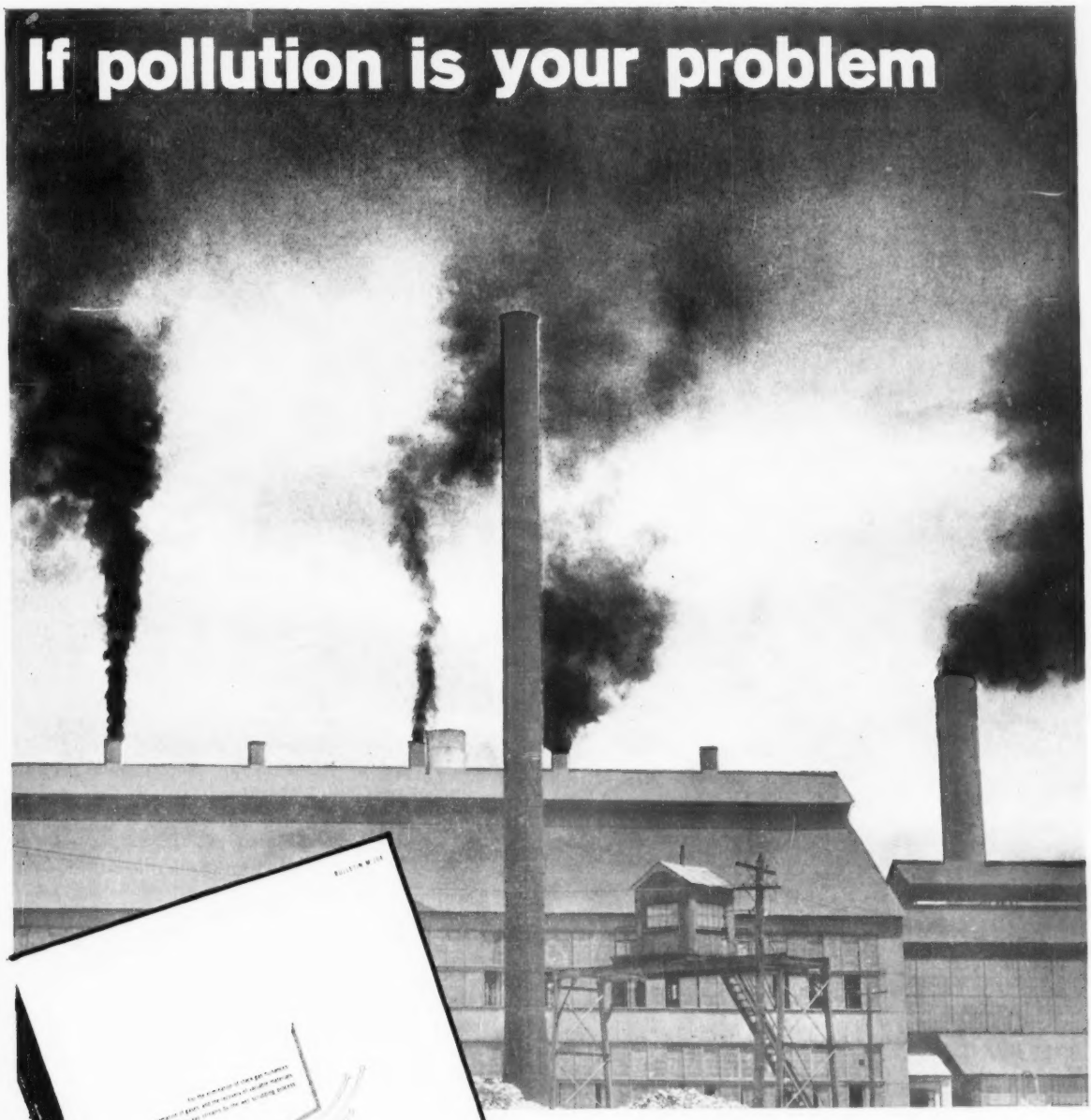

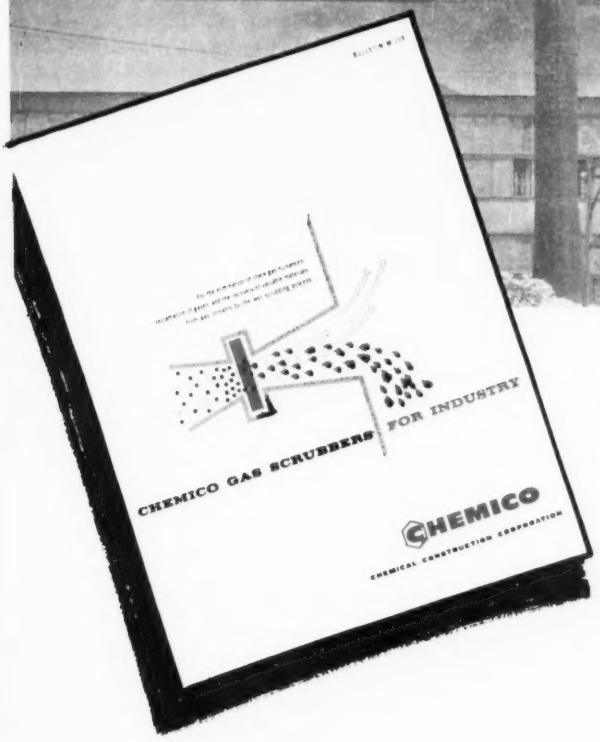

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Kudos on Contract Research

TO THE EDITOR: The other day I had an opportunity to read your very interesting and perceptive report "Behind the Coming Crisis in Technology" *(CW, Dec. 13, '58, p. 93)*.

Lauren Hitchcock's emphasis of the need for more basic research is certainly timely. It seemed to me also that the discussion of the costs of research and the opportunities that exist for utilizing independent laboratories was most helpful. I was, however, slightly distressed to find that you classified our own institution in the general category of "trade association laboratories." The Institute of Paper Chemistry is a nonprofit organization incorporated in 1929 under the laws of Wisconsin for the purpose of functioning as a graduate school, accumulating a definitive scientific library, and pursuing research in areas germane to the pulp and paper industry and related industries. We are not affiliated with any trade association. All of our research is either basic or developmental, and we assiduously avoid "commercial testing" or purely service enterprises. Our status as a nonprofit, graduate-educational institution is highly important from a tax standpoint. We have received many generous bequests from both foundations and philanthropies and participate in various activities in the educational world not appropriate for a typical trade association venture.

JOHN G. STRANGE
President
The Institute of Paper Chemistry
Appleton, Wis.

TO THE EDITOR: I think Lauren Hitchcock's report has done an equally great service to all consultants, consulting laboratories and to industry by so appropriately and thoroughly pointing out what the parties concerned have to give to each other.

JOSEPH R. EHRLICH
Ehrlich & Irany
New York

TO THE EDITOR: Lauren Hitchcock's report on "Contract Research: Cure for a Coming Crisis?" is most interesting. As a contracting research organization, we are fully aware of the need to maintain amicable relations with clients and suggest that much misunderstanding can be avoided by taking enough time in preproposal talks to assure mutual agreement on the definition of the problem and the approach to its solution. At times, the client's initial idea of the problem is an attempt to treat symptoms, not cure the real trouble. Adequate preproposal discussion will uncover these instances and prevent wasteful expenditure of R&D funds. Further, a majority of contract research organizations make no charge for preproposal talks and treat them with the same confidentiality accorded to contracts. . . .

HARRY W. BARR, JR.
Dept. of Economics
Battelle Memorial Institute
Columbus, O.

TO THE EDITOR: Our own experience confirms that of others; it shows that if both parties thoroughly understand the contract research arrangement before a project is undertaken, the chances of providing a satisfactory service are vastly improved.

All of us engaged in this type of work are indebted to Lauren Hitchcock for his fine analysis.

MARTIN GOLAND
Southwest Research Institute
San Antonio, Tex.

TO THE EDITOR: Congratulations to Lauren Hitchcock on the fine article on contract research.

I think it may interest you to know that three different people in The Lummus Co.—none of whom have any connection with Hitchcock—brought the article to my attention, consensus being "it is excellent." . . .

WILLIAM M. CREASY
The Lummus Co.
New York

Fire Research Studies

TO THE EDITOR: [Re the story on] fire research *(CW, Nov. 1, '58, p. 57)*. I was not aware that the Midwest Research Institute was doing any extensive fire research and was very happy to learn that it is. It has been my pleasure to be associated in a small way with some of the institute's developments. They are a very thorough and capable group and no doubt will add much to the safety

FABLE FOR TODAY: Acme Antibiotics, Inc., has applied to the U.S. Patent Office for a composition-of-matter patent on its new discovery, Omnimycin—the broadest-spectrum antibiotic ever discovered. But as it continues its dealings with the patent examiner, Acme discovers that one of its competitors, Best Bactericides Corp., has an application pending on Infinicillin — the broadest broad-spectrum antibiotic ever, according to Best's director of research.

Also, Best Bactericides' claims for Infinicillin, Acme discovers to its dismay, are extremely similar to its claims for Omnimycin. ("They might have been written about the same product!") And Best's first disclosure of its invention — in a communication to the editor of the *Journal of the Abyssinian Chemical Society*—predates Acme's (which went to the *Kuala Lumpur Annals of Medicine*) by almost six months.

So Acme's attorneys, the Messrs. Erstwhile, Caveat and Tort, begin to prepare for the inevitable patent-office interference case. But then, Acme President John Trueblue gets a flash of genius. (No, just call it a good idea.

"Why not just get together with Best and decide who has the best chance of getting a patent? Whoever gets it will license the other. Otherwise, we'll be spending $100,000 in fighting a case, and taking up an awful lot of our technical people's time. I'd rather see us put that money into our research program."

"But J. T.," shout Erstwhile, Caveat and Tort in unison, "you can't do that. Look at what the Federal Trade Commission is doing to those other antibiotics producers. They found themselves in litigation and tried to settle things in the most economical way. And now, it may cost them $1-million to defend themselves against an FTC complaint. No, J. T., forget about putting that money into research. These days you can't afford not to carry any patent-interference suits on to the bitter end."

H. C. Johnson

Editor-in-Chief

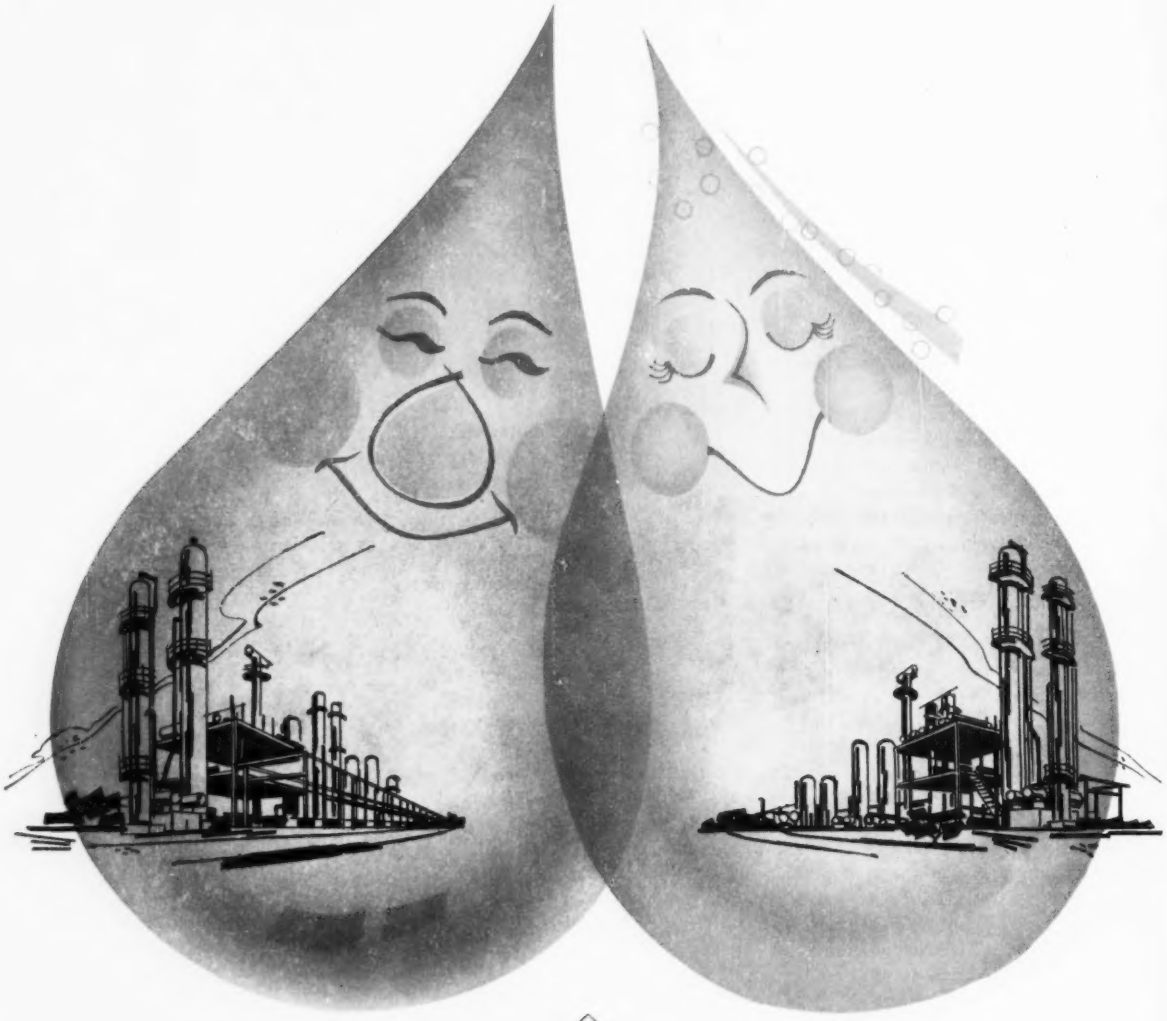
JEFFERSON CHEMICAL DOUBLES GLYCOL CAPACITY

Doubling Jefferson Chemical's previous ethylene glycol capacity, this new addition weighed in last week at a whopping 90 million pounds per year. Also getting a big boost is the di-, tri-, and tetraethylene glycol family, which shares a diversified market in many branches of industry.

This new plant, located in Port Neches, Texas, is convenient to unlimited raw material sources for ethylene glycol production, plus deep-water routes for economical distribution to national markets.

Part of a two-year expansion program, this latest new unit closely follows a 200% increase in ethylene capacity, a 50% increase in ethylene oxide production and the imminent availability of new chlorine and caustic soda facilities.

A comprehensive technical bulletin, *Ethylene Glycol,* is available from Jefferson Chemical Company, 1121 Walker Avenue, Houston 2, Texas.



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Soda Ash • Sodium Bicarbonate

117

know-how with their experimental work.

I am going to call this development to the attention of the members of the Fire Research Conference of the National Academy of Science in Washington, which is also planning extensive research and investigation on causes of fire and the phenomena of combustion. . . .

JAMES J. DUGGAN
Director of Safety
and Fire Protection
Union Carbide Chemicals Co.
South Charleston, W. Va.

Finessing the Sample

TO THE EDITOR: I'm sure most quality-control men will be somewhat miffed at the statement in the article "Charting the Way to Quality Improvement" (*CW, Jan. 3, p. 30*) that "statistically correct sampling is too expensive." Quality control's purpose is to optimize the combination of quality and cost—if the sampling is too expensive, then it is not statistically correct.

A proper quality-control investigation will provide quantitative information about sources of variability and their relative importance; after you have all the information, you can do anything you want to. You pays your money and you takes your choice. Now, sometimes you don't like what the study shows and you don't want to admit you're in trouble, so you keep doing it the old way. But still, with correct statistical data, you can minimize the cost per unit of information.

Your statement reminds me of the bridge player who would rather not have seen his opponent's hand, because now he knows that the finesse won't work.

FREDERIC A. OBSTFELD
Quality-Control Engineer
The General Tire & Rubber Co.
Akron

The quotation above appeared in this context: "It's a case of extremes. A chemical process is often so complex, statistically correct sampling is too expensive; or, in many batch processes, it is so easy to get a single representative sample, statistical techniques seem hardly worth it."

CW still feels that if, on economic grounds, the number of samples that can be taken are limited, the variance due to sample number may become greater than that from the sources of variability in the process itself. The limits of the statistical results, even at a 90% confidence level, may be so broad as to be essentially worthless.—ED.

Uncommon Book

TO THE EDITOR: You mention (*CW, Jan. 10, p. 84*) that the 1958 McKinsey lecture series by Crawford Greenewalt had appeared in book form. I would very much appreciate your telling me where this book is available so that I may obtain a copy.

GRAHAM B. KNIGHT
Boston, Mass.

Mr. Greenewalt's "The Uncommon Man" is being published by McGraw-Hill Book Co. The book, originally scheduled for publication Jan. 10, will now be published Feb. 2.—ED.

MEETINGS

Society of Plastics Engineers, 15th annual technical conference, Commodore Hotel, New York, Jan. 27-30.

American Society for Testing Materials, committee week meeting, Penn-Sheraton Hotel, Pittsburgh, Feb. 2-6.

National Assn. of Purchasing Agents, Chemical Buyers Group, midwinter conference, Commodore Hotel, New York, Feb. 3.

Parenteral Drug Assn., dinner meeting Statler Hotel, New York, Feb. 6.

American Institute of Mining, Metallurgical and Petroleum Engineers, annual meeting, San Francisco, Feb. 15-19.

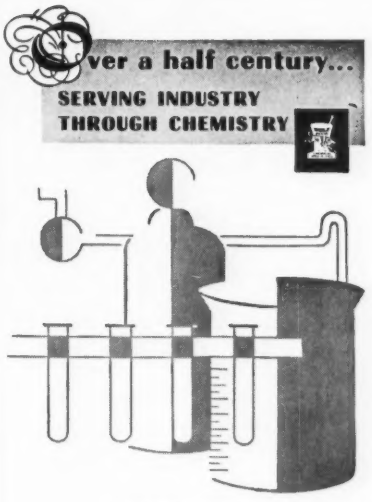
Chemical Market Research Assn., meeting; theme: chemicals for the textile industry; Dinkler Plaza Hotel, Atlanta, Feb. 18-19.

Technical Assn. of the Pulp and Paper Industry, 44th annual meeting, Commodore Hotel, New York, Feb. 23-26.

American Institute of Chemical Engineers and **American Chemical Society,** sixth annual joint technical meeting, King Edward Hotel, Beaumont, Tex. March 13.

National Assn. of Corrosion Engineers, 1959 Corrosion Show and 15th annual conference, Chicago, March 16-20.

National Chemical Credit Assn., sixth annual meeting, Sheraton Hotel, Philadelphia, Feb. 19.



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Business
Newsletter

CHEMICAL WEEK
January 24, 1959

Early reports confirm that CPI profits were rising steadily in the closing months of 1958.

Dow netted $16.8 million in the three months ended Nov. 30, compared with $11.2 million in the preceding quarter and $14.2 million in the final period of '57. Sales in the Sept.-Nov. '58 quarter topped $184.6 million, vs. $170.9 million in the preceding year.

Du Pont reports all-time record sales in the last three months of '58. Volume edged above $502 million despite a 7% drop in volume over the year. But profit margins, says Du Pont finance committee chairman Lammot Copeland, still aren't back to '57 levels. Year-end earnings should tally around $4.50/share, compared with $5.93/share in '57.

Diamond Alkali will post fourth-quarter earnings of about 88¢/-share, vs. 31¢/share in '57 and 58¢ in the September quarter. Part—17¢/share—of the fourth-period net comes from adjustments applicable to other quarters, but the rest, says Chairman Raymond Evans, is due to cost cutting and moderately improved business.

Hooker's sales and earnings for the fiscal year ending Nov. 30 came close to '57 levels: sales down less than 3%, to $125.5 million; earnings down 8%, to $20.1 million. Board Chairman R. Lindley Murray pointed out that sales during the last six months of the year exceeded those in the comparable period in '57.

And while Interchemical's '58 sales of $109.5 million were nearly equal to '57's ($109.9 million), fourth-quarter volume topped sales in the last three months of '57 by 5.2%. Per-share profits in '58—estimated earlier at $4.85-4.90—are now expected to be about $5.40, compared with $4.43 in '57.

Pharmaceuticals, too, are in on the current uplift. In New York this week and in Chicago late last week, executives of leading drug companies reported on recent gains and foresaw mounting sales, spurred on by demands of a growing population and imaginative research.

Parke, Davis President Harry Loynd estimates '58 sales were $172 million, a 6% gain over '57's $162.3 million; but he figures earnings in '58 about equaled the previous year's $27.9 million. In '59, he expects a 10% rise in sales and a 5% pickup in net income.

Pfizer President John McKeen told *CW* '58 sales were up 7.2%, to $222 million, and earnings up 4.3%, to $4.40/share. He expresses confidence that FTC's antibiotics case won't keep Pfizer from hitting its '60 sales goal: $260 million.

Rexall Drug's fourth-quarter net was slightly more than $2 million—on a par with the September quarter, but substantially higher than first- and second-period results. Fourth-quarter sales probably topped $50 million.

Business
Newsletter

(Continued)

Reichhold Chemicals is expanding, refinancing, and—maybe—splitting its stock. All this comes on top of news that RCI's '58 sales were a record $74.2 million, up 13.6% from the $65.3 total in '57.

Latest expansion move is in Portugal (*p. 25*). Refinancing will involve loans aggregating $12.5 million from a Detroit bank and three life insurance companies. Purposes: to retire about $8.1 million of old debt, thus eliminating the company's mortgage and subordinated obligations, and to provide money for corporate expansion and additional working capital. In addition, the bank is extending a $3-million line of credit —also for expansion and working capital.

The proposed two-for-one stock split will be voted on at a special stockholders' meeting in March. Authorized common stock would be increased from 3 million to 10 million shares, and cash dividends would be upped to 15¢/share—equivalent to a 20% boost over present rates. RCI stock was listed on the New York Stock Exchange last June, mounted steadily from a low of $31.50/share to last week's high of $63⅞.

•

Propellent-producing Callery Chemical is now owned 50-50 by Gulf Oil and Mine Safety Appliances. All three companies are based in Pittsburgh.

Gulf came into the picture not quite two years ago, just before selling its $30-million-plus interest in Texas Gulf Sulphur. At that time, Gulf acquired 25% of Callery's stock, with an option to buy another 25% later; and reportedly transferred its high-energy fuel research to Callery.

MSA and Gulf said this move "completes the joint-ownership plan"; and that Callery management "will continue on its present basis."

•

Olin Mathieson's finances now glow with health, according to Wall Street's latest diagnosis. With OM President Stanley Osborne indicating that the company's aluminum operation may be in the black by summer, investors are guessing that this year's net might be more than triple last year's—less than $1/share. OM stock, which slid from a '57 high of $61.75 to a '58 low of $31.50, was last week selling for as high as $47.75.

Last week, OM completed its spin-off of "odds and ends" by selling back to F. H. McGraw & Co. the 200,000 shares of McGraw stock—a 44% interest—that OM acquired more than two years ago.

•

Dow Chemical of Canada plans to expand in oil-rich Alberta. It has started engineering work on two projects: a chlorine-caustic plant that probably will be built on a site being purchased near Fort Saskatchewan, about 12 miles northwest of Edmonton; and a phenol plant, location for which probably will be decided within two months. Other products under consideration in this program: hydrochloric acid, glycols, plastic foams.

Harold M. Annis is Technical Director of Oxford Paper Company, which is currently completing its new $4 million North Star Coater project. This remarkable new coating machine will coat papers at speeds ranging from 200 to more than 2,000 feet per minute; makes possible letterpress, offset, and gravure papers with a superior level printing surface unobtainable heretofore by conventional methods.

"Wyandotte has contributed much to progress in paper coating"

— says Harold M. Annis, Technical Director, Oxford Paper Co., New York City.

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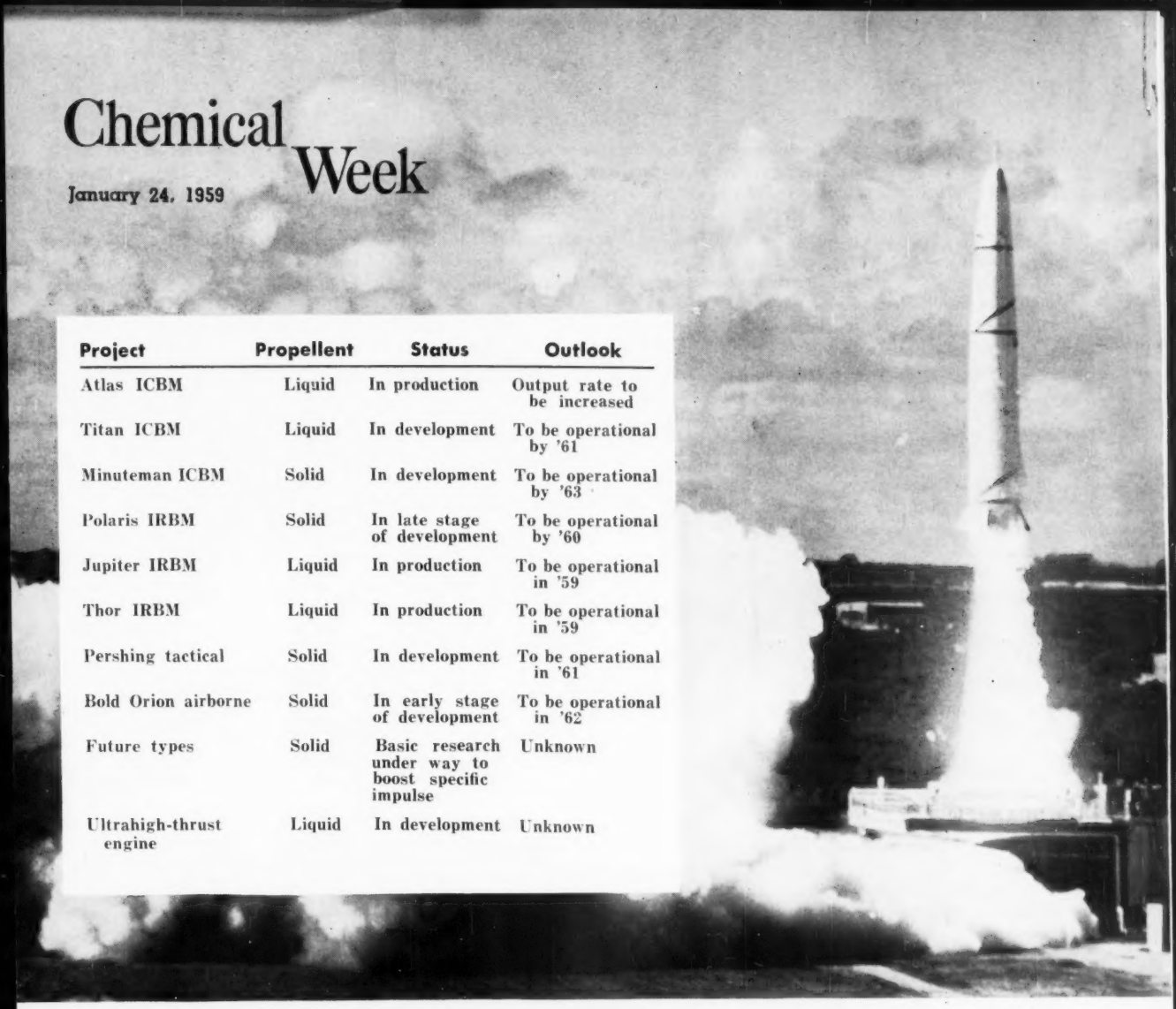
Chemical Week
January 24, 1959

Project	Propellent	Status	Outlook
Atlas ICBM	Liquid	In production	Output rate to be increased
Titan ICBM	Liquid	In development	To be operational by '61
Minuteman ICBM	Solid	In development	To be operational by '63
Polaris IRBM	Solid	In late stage of development	To be operational by '60
Jupiter IRBM	Liquid	In production	To be operational in '59
Thor IRBM	Liquid	In production	To be operational in '59
Pershing tactical	Solid	In development	To be operational in '61
Bold Orion airborne	Solid	In early stage of development	To be operational in '62
Future types	Solid	Basic research under way to boost specific impulse	Unknown
Ultrahigh-thrust engine	Liquid	In development	Unknown



Dual-purpose Thor will go to bases in Europe next month, later help launch reconnaissance satellites.

Hotter Rivalry Hits CPI's Rocket Profits

Uncle Sam's burgeoning missile and space program is becoming the chemical industry's biggest growth market. And the President's budget message makes it clear this week that the market is growing. But it's a field in which competition is tightening and profitability is limited.

Chemical companies have emerged as major suppliers for the missile program; some industry experts contend that they are getting close to 25% of government expenditures in this field.

President Eisenhower is proposing expanded budgets for military and scientific rocket work (*CW Washington Newsletter, p. 27*) and Congressional leaders—concerned about Russia's apparent edge in this field—are vigorously advocating even higher outlays.

Measure of Growth: One measure of growth in this highly specialized industry is Defense Dept. spending for production of missiles. These expenditures (including payment for fabrication of prototypes and testing of new weapons) rose by about 26% from 1957-58, to a total of $3.4 billion in the current fiscal year. They will probably climb by 32%, to about $4.5 billion in the fiscal year starting July 1.

Military spending for missile research and development totals about $500 million for this fiscal year—at least $65 million more than was spent in 1957-58. And the combined budget of the Defense Dept. and the National Aeronautics & Space Administration for space projects is well above $300 million this year, with prospects for an increase of 50% in 1959-60.

With additional missile types becoming operational each year (*see table, above*), it's reasonable to assume that increasing quantities of propellents will be needed. So far, for example, nine Atlas squadrons have been authorized and military launching sites are under construction near Cheyenne, Wyo., Spokane, Wash., and Omaha, Neb. Other Atlas squadrons may be authorized later—depending partly on how rapidly and smoothly the Air Force can proceed with its Titan flight-test program.

Ponderables: But there are ponder-

able limiting factors for CPI companies—those already participating in the rocket program and those considering entry into the field. Profits on government contracts usually are lower than on commercial contracts of the same size. And the extremely high rate of obsolescence in missiles tends to curb big-volume production—of propellents as well as of "hardware." The field, moreover, is becoming more competitive each year.

Thiokol Chemical provides an illustration of the profitability factor. In 1957, Thiokol's military contracts—on which average profit was about 2.9%—accounted for 75% of total sales, but only about 50% of total earnings. The New York Stock Exchange observed last week: "Thiokol stockholders have never received a cash dividend. But in each of the past five years, 5% stock dividends were paid."

Under the strain of budget restrictions, the Pentagon is reducing weapons development projects—weeding out increasing numbers of missile projects before they reach the production stage. Then, under the realities of current strategy concepts, production rates of the latest missiles will be kept relatively low. Lengthy production runs, characteristic of aircraft and weapons manufacture, are a thing of the past.

Present plans for the Titan, for instance, call for about four squadrons, each with at least 10 missiles. There is some talk that output may be boosted to supply seven more units. Titan also will be produced for use as a launching vehicle for satellites.

Stiffer Competition: There's more rivalry in the missile program as a whole—and in the propellents field in particular—than ever before. Example: in the Minuteman project, Thiokol has a research and development contract on the first-stage rocket in competition with Aerojet-General, which is doing what the Pentagon calls "unlimited backup" work. These two companies also are competing on the second stage; Thiokol's job here is described as a "parallel program stressing a different engine casing."

Aerojet has the prime R&D contract on the third stage, with Thiokol doing what the Pentagon calls "backup work contingent upon verification of propellent properties." And a third company—Hercules Powder—is running a "limited program to thoroughly explore double-based propellent potential." It means these companies are competing in relatively low-profit R&D work for contracts that are highly uncertain in every respect, will probably be narrowly limited in volume and profit margin, and may not materialize at all.

Another aspect of mounting competition in this field: specialty companies, such as Thiokol, that were in earliest on solid-fuel contracts, now must compete with basic chemical producers. The latter formerly supplied propellent raw materials, but now bid for prime propulsion contracts.

Such contracts — accounting for about 15% of total missile and space budgets—are going more and more to makers of solid fuels. Air-breathing engines are being phased out of USAF procurement programs; and a pronounced decline is anticipated for liquid-fuel rocket systems—at least where all military missiles are concerned. Few more, if any, air defense, tactical, or strategic liquid-propelled missile development projects are likely to be authorized.

But the solid-propelled rocket market has not been wholly cornered by companies already in production or in the later stages of development. Says a top-level government expert: "There will always be room for high-powered and inspired design of better rockets. There's always room for a better mousetrap. And in this game, we can certainly stand some."

Clash over Sulfur

In Alberta, Freeport Sulphur Co. has clashed with two Canadian pipeline companies in a hearing on whether the Alberta Oil and Gas Conservation Board should permit those companies to export sulfur-bearing natural gas from the province.

Freeport Vice-President John Carrington asked the Alberta board not to grant the pipeline applications until the board can make "a thorough study of the economic factors and marketing problems involved in the development of the sulfur in these gas reserves." The pipeline companies—Westcoast Transmission Co. and Alberta and Southern Gas Co.—hinted in their questioning of Carrington that Freeport was simply worried about Canadian competition in sulfur.

Carrington said Freeport is "deeply concerned over what may become a serious oversupply of sulfur during the next five or six years."

He recounted that the U.S. sulfur industry operated at only about 60% of capacity during much of '58. He said that sulfur recovery projects, particularly in France, plus new Frasch and pyrite sulfur projects in the U.S. and other countries, are likely to increase Western world production capacity by nearly 3 million long tons/year.

This additional capacity, he declared, probably will not be needed until '65. But in 10 to 15 years, Carrington said, "we are confident the world will need all the Canadian sulfur production now foreseen and probably a great deal more."

He proposed that the board consider whether it would be feasible to defer development of gas fields with hydrogen sulfide content of more than 10%; or whether hydrogen sulfide could be separated from natural gas destined for export and placed in underground storage for future use.

CPI's Atomic Bond

Going into operation in New Jersey this week: a 5,000-kw., swimming-pool-type nuclear reactor, to be operated as a research tool by Industrial Reactor Laboratories, Inc. IRL is a joint venture of 10 large industrial concerns.

Six of the sponsoring companies are in the chemical process industries, and much of the research will involve chemical reactions and materials.

Studies will probe the use of high-energy radiation sources to: trigger or expedite numerous types of chemical reactions; change the properties of plastics and various reactor materials; reduce the number of steps required to produce certain chemical end-products (*CW, Aug. 27, '55, p. 44*).

CPI companies participating: Atlas Powder, Corning Glass, National Distillers and Chemical, National Lead, Socony Mobil Oil, and U.S. Rubber. The reactor—described as "the world's largest nuclear reactor entirely owned and operated by private industry"—is **housed in an 87-ft.-high** aluminum dome near Plainsboro. It was built by American Machine & Foundry's AMF Atomics Division (*CW, June 21, '58, p. 24*).

ICI's Overseas Operations
Over 100 plants in United Kingdom
ICI's 1957 exports $214.5 million
Exports to Europe $56.5 million
Exports to U.S. $14 million
• Main plants of subsidiary and associated companies

Mustering Strength for World Sales Drive

As European governments move toward freer world trade, the vast expansion plans of Imperial Chemical Industries, Britain's chemical colossus, assume new meaning here. This week, ICI is planning a major new growth project—a $280-million petrochemical complex. Construction will start this year, be completed by 1970 on a 2,000-acre site on the River Severn in southern England.

Several other ICI expansions are now in the building stage. In England, the company is doubling its terephthalic acid capacity with a new, 30-million lbs./year plant. It's also building a beryllium plant to supply the British Atomic Energy Authority and, eventually, jet aircraft and missile makers. At Botany, New South Wales (Australia), ICI is already doubling capacity of its year-old, $4.8-million polyethylene plant; the new facilities will cost an additional $2.4-million.

And in the U.S., ICI's joint venture with Celanese into Teron polyester fiber—Fiber Industries, Inc. (*CW, Oct. 25, '58, p. 37*)—gives the company an entry in the hard race for U.S. synthetic fiber sales.

Running Giant: ICI's lively postwar history is marked by almost whirlwind growth. Output in '57 was about double that of '48, triple the 1939 level. Consolidated sales (including sales of majority-owned subsidiaries) hit $1.3 billion in '57—second only to those of Du Pont. But total sales for the parent ICI company alone were $869.7 million in '57. Consolidated profits were $172 million, including $130 million from the parent company.

Today, ICI is the largest manufacturing corporation in England, accounts for one-third of Britain's total chemical sales. Its fixed assets add up to some $1.5 billion, including about $300 million in majority-owned overseas subsidiaries. It employs more than 116,000 in 100 plants in the U.K., is part owner of some two-score plants in 15 foreign countries (*map, above*), has marketing organizations in 44 countries, interest in nearly 100 subsidiaries. Its 12,000 products range from heavy chemicals, fertilizers, explosives, paints and nonferrous metals, to pharmaceuticals, synthetic fibers and plastic zipper-type fasteners.

Room to Grow: More and more since World War II, ICI has reached out beyond the confines of England.

Its exports from the U.K. have risen from $103.6 million in '48 to $214.5 million in '57. Even more important has been the establishment of new manufacturing ventures overseas, particularly in the Commonwealth countries. Recent and typical: the new, $10.5-million explosives plant in Gomia, India, owned 80% by ICI,

20% by the Indian government.

In Canada, ICI owns 82% interest in the sprawling Canadian Industries Ltd., which chalks up more than $130 million/year sales.

In '57, ICI's many overseas subsidiaries and associated companies scored $340 million in sales. Include export sales of the parent company, and foreign revenue accounts for almost half of total consolidated sales.

Already, ICI has a sizable stake in the U.S. The company's exports to the U.S. totaled about $14 million in '57—mostly in semifabricated nonferrous metals. Low conversion costs give ICI a price advantage.

Eyes on U.S.: Further moves into the U.S. will hinge largely on the results of ICI's research and development program. "It's not an easy market to get into," E. A. Bingen, director of operations in North America, told *CW*. "We're likely to get a really good foothold only where we're well ahead of U.S. companies." When it does take another step into U.S. production, the arrangement will probably follow the pattern of the Fiber Industries venture with Celanese: ICI will contribute technical know-how; the U.S. partner will provide the market setup.

Besides Fiber Industries, ICI has two other U.S. subsidiaries. ICI Ltd. (New York) serves as the parent company's "eyes and ears" in the U.S. And ICI holds 85% interest in Arnold Hoffman & Co. (Providence, R.I.), which markets dyestuffs in the U.S. and Latin America.

'Common Market' Worries: Like most British companies, ICI is casting an anxious eye on "Common Market" developments. The six "Euromart" countries are customers for the bulk of ICI's European exports—$56.5 million worth in '57. The exclusion of England from the coming rounds of tariff cuts and import quota boosts could hurt.

In general, ICI believes in free trade, despite its recent participation in an attempt to gain a tariff boost—from 10% to 33⅓%—on polyvinyl chloride, polyethylene, polystyrene, and polymethyl methacrylate.

In its attitude toward trading with Soviet countries, ICI reflects the prevalent western European opinion. It has made "not very large" sales to the Communist bloc, and is actively seeking further business.

Patterns of Change: During the postwar years, ICI's production pattern has been shifting away from a predominance of heavy chemicals. The staples have continued to grow (ICI says it supplies one-eighth of the world's alkali), but they represent a diminishing proportion of total sales.

The most notable shift has been the swing into petrochemicals and plastics. ICI's plastics exports have increased 10-fold in the past decade, hit $34 million in '57.

Terylene, the polyester fiber for which it holds world rights (excluding rights in the U.S.) from Calico Printers Assn., is one of ICI's most successful products. Capacity in England will soon hit 30 million lbs., is slated for eventual expansion to 50 million lbs.

Also evident: a strong bid for consumer markets for pharmaceuticals and paints. And it is evident in its recent deal with Ilford for commercialization and sales of ICI's color film process (*CW, Sept. 6, '58, p. 33*).

The new River Severn complex, with its southern England location, symbolizes ICI's postwar move away from coal to petroleum for a raw material—part of the general trend of the U.K. chemical industry.

Form and Substance: Several factors lie behind the company's massive growth. Government protection is one of them. ICI was born with government approval in 1926 of a merger of England's four major chemical companies: British Dyestuffs Corp. Ltd., Brunner, Mond & Co., Nobel Industries Ltd., and United Alkali Co. Ltd. It was nurtured by stiff, war-inspired tariff policies protecting production of all synthetic organic chemicals.

Then, once it was on its feet, ICI prospered under some of the most progressive management policies in England. For technical alertness, production know-how, sales efficiency and personnel relations, ICI has a standout reputation among chemical men.

Heading the ICI empire is Sir Alexander Fleck, ICI's third Scottish chairman in a row. Fleck started with a Brunner, Mond subsidiary as a research chemist, climbed steadily up the ICI ladder after the merger, reached the chairmanship in '53.

His technical bent is reflected throughout ICI's top echelons. Sixteen of the 19 full-time board members (equivalent to U.S. company vice-presidents) and 165 of the 240 top men below the board level hold scientific or engineering degrees.

Balance of Power: At the heart of ICI's operations is a balance between centralization and decentralization. The board is divided into "group" and "functional" directors. The functional directors take charge of centralized staff operations, such as commercial matters, development, finance. Group directors are each responsible for a few related divisions, serve as liaison between the board and the divisions. The 14 manufacturing divisions have near autonomy. But domestic sales for all divisions are centralized through a regional selling organization.

Overseas operations are carried on by wholly owned subsidiaries when they are limited to marketing, and by partly owned subsidiaries when they are actually engaged in production.

For the future, Sir Alexander sees greatest growth potential in man-made fibers and new metals for nuclear engineering.

The growth of ICI's overseas operations points up the promise of stiffer competition for U.S. firms, as well as a clear confirmation of future opportunities in burgeoning world markets.

Further Proof Needed

First round of hearings in Federal Trade Commission's "antibiotics monopoly" case ends this week in New York, with FTC lawyers trying to document their charges against Pfizer, American Cyanamid, Bristol-Myers' Bristol Laboratories, Upjohn, and Olin Mathieson's Squibb Division.

In a departure from customary trial procedure, FTC is presenting the bulk of its more than 900 documentary exhibits before calling any witnesses. So far, most of the 200 papers offered as evidence relate to the charge that Pfizer got its 1955 tetracycline patent only through misrepresentation and withholding information from the Patent Office.

Last week, Hearing Examiner Robert Piper—admittedly a novice in patent law and knowledge of pharmaceuticals—ruled that FTC's case would depend on whether it could show that the companies withheld "material and probative information." FTC attorneys had argued it would suffice to prove the fact of withholding.

COMPANIES

National Gypsum and **Huron Portland Cement Co.** directors have reached agreement on merger terms. National would acquire the Buffalo cement producer by exchanging 1,014,300 shares of its stock—one National share for each 0.7 Huron share.

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General Dynamics Corp.'s Liquid Carbonic Division has acquired Industrial Air Products of the South, a manufacturer of industrial gases in New Orleans and Pascagoula, Miss.

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Dominion Tar & Chemical Co. will boost its annual dividend from 50¢ to 60¢/share. First payment at the new rate will be made on May 1 to shareholders of record April 1. The increase is reported to be based on improved '58 earnings.

•

Dow Chemical Co. has formed a new engineering unit, Gulf Coast Engineering Consultants. To be headquartered in Houston, Tex., it will serve Dow's Texas and Louisiana divisions. Texas Division engineer J. M. Parish will head the new group.

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Chas. L. Huisking & Co. (New York) is merging three of its affiliated companies into new operating divisions. Newly elected President William Huisking said the three affiliates—Glyco Chemicals, Clintbrook Chemical Co. and Peder Devold Oil Co.—will be consolidated to strengthen financial structure and to facilitate a planned expansion of product lines.

•

Sterling Drug Co. has acquired Delaware Poultry Laboratories Inc. (Millsboro, Del.) for an undisclosed amount of cash. The Delaware firm, a manufacturer of poultry vaccines and animal medicines, will operate as a separate subsidiary.

EXPANSION

Oxygen: Linde Co. division of Union Carbide is now blueprinting a 94-million-cu. ft./month oxygen plant for the Gary, Ind., works of U.S. Steel. The new unit, to be owned and operated by Linde, will also turn out 256 million cu.ft./month of high-purity dry nitrogen. Construction will be completed in about six months.

A 94-million-cu. ft./month oxygen plant, built by Linde, went into operation last June at the Gary steel producing complex.

•

Dyes: Bell Chemical Co. (Reading, Pa.), maker of dyes for synthetic materials, is expected to build a new plant in Chester, Pa. The company purchased eight acres in the city six months ago and placed 15 more acres under option.

Bell's Reading plant burned down two weeks ago, when brisk winds toppled a bucket of burning wood being used by roofers. No injuries were reported. Damage: $400,000.

•

Vinyl Resins: National Starch Products Inc. is readying a second addition to its vinyl acetate plant in Meredosia, Ill. The new facilities, which will up capacity by 50%, are slated for completion in March '59. First expansion of the Meredosia plant took place in '56, when capacity was doubled.

•

Pharmaceuticals: A. H. Robins Co. has bought 12½ acres near its Richmond, Va., plant for expansion. Cost: $250,000. It's believed the company will build a new research laboratory, office and warehouse there. Production units at the old site may also be expanded.

•

Epoxies: Pennsylvania Lacquer Center (Philadelphia) will expand its Haddonfield, N.J., plant. Plans call for a 5,000-sq. ft. addition to be used for manufacture of epoxies. Completion is scheduled for Feb. '59. Cost was not revealed.

FOREIGN

Chemicals/Ireland: As part of its new five-year program to expand national income 2%/year (twice the '58 rate), Ireland is luring foreign investors with tax credits. The government will help finance a $17-24-million nitrogenous fertilizer plant, and will spend $24.5 million on new subsidies for phosphate fertilizer to lower the price to $11/ton below the world price.

•

Fertilizer/Peru: With construction almost complete, Fertilizantes Sinteticos' (FERTISA) $10-million petrochemical plant is slated to start up early this year. Initial annual output: ammonium nitrate, 25,000 tons of fertilizer grade, 5,000 tons of explosives grade; nitric acid, 1,500 tons; ammonium sulfate, 15,000 tons; anhydrous ammonia, 1,000 tons.

•

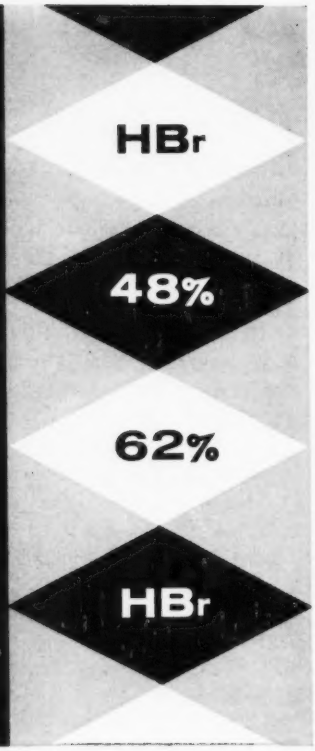
Resins/Portugal: Resinas Sinteticas (RESINTELA), an affiliate of Reichhold Chemicals, has started initial production of resins at its new plant near Lisbon. Production of the basic materials, formaldehyde and phthalic anhydride, will start in about a year.

•

Chemicals/Rumania: With financial help from Russia, Rumania's chemical industry is slated to expand 19% this year. Investments of about $580,000 are planned. Three plants are already under construction. Onesti Chemical Combine's Synthetic Rubber Division is slated to turn out 50,000 metric tons/year of butane and butylene; its Phenol Division will produce 30,000 metric tons of phenol and acetone by '62. The Borzesti plant is scheduled to produce 13,000 metric tons/year of polyvinyl chloride.

Hydrobromic Acid

Can help you make drugs, dyes, fluxes, perfumes, photo chemicals



Check these useful reactions: Hydrobromic acid is a strong acid which reacts readily with most inorganic bases to produce inorganic bromides such as lithium, sodium, potassium and ammonium bromide, useful in photographic processes.

It reacts with many aliphatic alcohols in the presence of dehydrating agents to produce aliphatic bromides. Aliphatic bromides, which are generally more reactive than the corresponding chlorides, are useful in the preparation of Grignard reagents and other organometallic bromides, quaternary ammonium salts and as alkylating agents.

Hydrobromic acid can be used to cleave ethers to produce aliphatic alcohol and bromide. It will also react with epoxides to produce vicinal bromohydrins with two reactive centers, thus, permitting many additional reactive possibilities.

Ask for our help: Michigan Chemical produces 48% Technical Grade Hydrobromic Acid and is the sole producer of 62% Technical Grade Hydrobromic Acid in commercial quantities. Our wide experience in bromine and bromine derivatives is immediately available to you through our Technical Service Group. Our plants in Saint Louis, Michigan and El Dorado, Arkansas provide dependable sources for high purity bromine chemicals in constant supply—up to tank car quantities, if desired. Write us about your area of interest or for technical data and prices.

Analysis:	48% Technical
Molecular Weight:	80.924
Specific Gravity at 20/4° C:	1.488
Pounds a gallon at 20° C:	12.4
HCl, not more than:	0.10%
Vapor Pressure at 30° C:	——
Vapor Pressure at 50° C:	——

Analysis:	62% Technical
Molecular Weight:	80.924
Specific Gravity at 20/4° C:	1.74
Pounds a gallon at 20° C:	14.5
HCl, not more than:	0.15%
Vapor Pressure at 30° C:	85 mm
Vapor Pressure at 50° C:	380 mm

For complete listing of Michigan Chemical products, see your copy of Chemical Materials Catalog or Chemical Week Buyers Guide.

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Washington
Newsletter

CHEMICAL WEEK
January 24, 1959

Eisenhower's 1959-60 budget affects many projects of chemical industries interest.

(1) Development and production of solid-fuel rockets will be pushed hard next year. The budget plans for an $800-million boost for missiles—with solid-propellent missiles taking up an increasing chunk of the total. Funds for the Air Force's Minuteman solid-fueled ICBM will be hiked 40%. The liquid-propellent Thor and Jupiter IRBMs will be phased out of production next year, the Polaris solid-propellent fleet ballistic missiles will be speeded. Other solid-fuel missile projects to be accelerated include: Army's Pershing, Sergeant, Nike Zeus and Nike Hercules; the Navy's Sparrow III and Eagle.

(2) Research to develop economical ways of producing fresh water from salt water gets a small boost: up from this year's $1,170,000 to $1,355,000—not enough of an increase to satisfy the critics.

(3) Food additive legislation accounts for part of Food & Drug's $2-million increase over this year's $9.8 million.

(4) Air polution research is in for $4,212,000—an increase of $200,000, most of which goes for research into automotive exhausts.

(5) Water pollution research and enforcement holds at this year's $3 million for grants to states, $3.7 million for the agency.

(6) TVA's fertilizer activities continue the same in the '60 budget as in '59's: $1,783,000. TVA plans to start "high-temperature techniques" for fixation of nitrogen. Tonnage of higher-analysis superphosphate will be increased; distribution of ammonium phosphate-nitrate, sulfate-nitrate and liquid fertilizer will increase. Farmer payments for fertilizer used in test demonstrations come to $459,000, "about 58% of the cost of the material."

Research and development spending for all federal agencies is estimated at $5.5 billion; $4.6 billion goes for "national security needs." Of this group, some $3.1 billion is for the military.

For nonmilitary agencies, the new space agency and the Dept. of Health Education & Welfare are each slated for some $300 million of R&D money.

Of the total R&D money, $1.3 billion is for research only—excluding development, test, etc. The Dept. of Defense takes $500 million of this, with the balance spread among other federal agencies.

Basic research is pegged for $500 million in total funds; $100 million goes to the Defense Dept., $100 million to the space agency, $80 million to the National Science Foundation with the balance spread to other agencies.

The Administration wants to hike fees for services rendered by the federal government. In all, it is proposing to bring in some 1.3 billion of additional revenue from higher fees, $3.5 million from higher patent and trademark fees.

•

U.S.-Russian trade has fizzled as a major issue in Soviety Deputy Premier Anastas Mikoyan's talks with leading U.S. businessmen and government officials. The Russian economic chief has failed to spell out details of what the Soviets are willing to offer in trade and how the Kremlin proposes to finance an increase in commerce between the two nations—other than repeat and refer to Premier Khrushchev's previous trade proposals.

The Khrushchev proposals, twice rejected by the White House, called for long-term credits granted and supported by federal funds. The list of commodities Khrushchev offered in return for advanced manufactures, including chemical equipment and machinery, was made up primarily of raw materials. These included many nonferrous metals and minerals that are already in such oversupply in the U.S. that domestic producers are asking import restrictions against shipments from friendly nations, mainly Canada and in Latin America.

Chemicals was the one item Mikoyan specifically mentioned in a speech before the Economics Club in New York last week. He said a shipment of chemicals ordered by Russia from the U.S. was delayed past the point of no return by the U.S. State Dept., according to the U.S. exporter's own explanation. Mikoyan called vaguely for a return to the U.S.-U.S.S.R. trade relations of the 1930s, when there were no international East-West strategic trade curbs.

In the absence of any specific proposals, trade officials in Washington don't see any chance of significantly increased U.S.-Russian trade —despite the interest in it Mikoyan has reported on his cross-country tour. Washington has made it clear it will not take the initiative in relaxing trade curbs.

•

Disposition of General Aniline & Film Corp. is at issue again. Atty. Gen. Rogers wants Congress to pass a law letting him sell the $100-million firm even before legal controversy has been settled.

Proceeds from the sale would be held in escrow until legal battles have been decided. But, Rogers wants to get the former German firm off the government books. Present law prevents sale until the former owners have their full day in court. Prospect is that Sen. Olin Johnston D., S.C.) will again move to block a sale by insisting on all legal obstacles being solved before disposition. Johnston has, in the past, backed legislation aimed at returning the property to former owners.

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U.S.I. CHEMICAL NEWS

Jan. 24 ★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1959

Market for Rigid Urethane Foams Growing Rapidly

While rigid materials accounted for less than 10% of the total polyurethane foam market in 1957, 1958 figures are expected to show an increase to more than 20% of the total market. The Society of the Plastics Industry feels that by the end of 1959, 30-40% of the demand will be for the rigid foams.

The material is proving ideal for industrial and home insulation. Packaging applications are expanding. Makers of marine equipment are using the rigid foams for buoyancy. Military applications include radiation shields and heliohuts. More and more, structural panels and laminates are being made with rigid urethane foams.

Users can buy fabricated foam or they can foam the material themselves in place, by employing either molding or spraying techniques. Special equipment has been developed for spraying urethane polymer onto overhead, vertical or irregular surfaces. It foams and sets in place rapidly to give a rigid coat which will not slip, sag or fall away.

Rigid urethane polymers are formed by mixing two chemical components—polyisocyanates and polyesters. Carbon dioxide gas is given off during the reaction and it serves as a blowing agent which causes the polymer to foam in place. An intermediate that can be used to produce the polyester component is ISOSEBACIC® acid, a mixture of C-10 dibasic acids. ISOSEBACIC acid will be available soon in commercial quantities from a new U.S.I. plant at Tuscola, Illinois.

"Stabilized" Polyethylene Fabrics Now Being Made Via New Finishing Process

A patented technique for finishing polyethylene fabrics is now being employed to improve shrink resistance, strength, appearance and other physical characteristics. According to the patent, conventional finishing methods for polyethylene fabrics—calendering or hot fluid treatment of the greige goods to preshrink them—result in loss of yardage, strength and optimum appearance.

The patented process involves the pretreatment of oriented polyethylene filaments before conversion to give them a residual shrinkage of 8-20% (tested at 75°C for 20 minutes). The filaments are then converted to greige goods, in which they have a wavy form.

The greige goods are subsequently held along both the length and width to prevent retraction and are heated at a strictly controlled temperature for a limited time. So held and treated, the filaments in the fabric shrink to the extent of their residual shrinkage and straighten out, without reducing the area of the fabric.

By comparison with fabrics finished by conventional methods, these materials are said to have better appearance, strength and aging properties. The process is claimed to provide economies in operation — to save yardage and to reduce the number of finishing steps required.

Gov't. Authorizes Substitutions In SDA 40 Alcohol Formulation

Shortage of Brucine Denaturant Made Modifications Necessary.

SDA 40, which the U. S. Government authorizes for use in toilet goods, external pharmaceuticals, biocides, detergents, etc., has been formulated until now with ⅛ gallon of *tert.*-butyl alcohol plus 3 ounces of brucine alkaloid or 3 ounces of brucine sulfate per 100 gallons of ethyl alcohol. To relieve difficulties of denaturers and users of this formulation due to a critical shortage of brucine, the Internal Revenue Alcohol and Tobacco Tax Division (A. & T. T. D.) has authorized the formulation of SDA 40 with ⅛ gallon of *tert.*-butyl alcohol plus either 1½ ounces of brucine alkaloid, or 1½ ounces of brucine sulfate, or 1½ ounces of quassin per 100 gallons of ethyl alcohol.

How the Substitutions Came About

When the brucine shortage first became acute, an inability to meet customer requirements for SDA 40 threatened to upset the entire industry. Recognizing the situation, the A. & T. T. D. authorized quassin as an alternate denaturant.

While brucine is one of the bitterest materials known, quassin had been tested and found sufficiently bitter and acceptable from other standpoints to serve as an alternate denaturant. Quassin had been used as a denaturant in Canada for 25 years, and this experience dispelled concern about possible adverse effects arising from its use.

Samples of SDA 40 denatured with quassin were offered to the trade, and users were urged to make up their products with this alternate, to assure compatibility with their formulas. After testing, many customers advised that they would accept SDA 40 alcohol with this denaturant.

However, realizing that limitations on the supply of quassin made it an incomplete answer to the shortage, the A. & T. T. D. took quick action to extend existing supplies of brucine by authorizing denaturation with reduced quantities of brucine alkaloid and

MORE

SDA 40 AUTHORIZED USES
(Under Permit)

- Hair and Scalp Preparations
- Bay Rum
- Lotions and Creams (Hand, Face, Body)
- Deodorants (Body)
- Perfumes and Perfume Tinctures
- Toilet Water and Colognes
- Shampoos
- Soaps and Bath Preparations
- External Pharmaceuticals (not U.S.P. or N.F.)
- Disinfectants, Insecticides, Fungicides and Other Biocides
- Cleaning Solutions (including Household Detergents)
- Theater Sprays, Incense and Room Deodorants
- Miscellaneous Dye Solutions
- Miscellaneous Solutions

Vitamin C Indicated for Virus & Other Infections

Several medical investigators have found that continuous massive doses of ascorbic acid (Vitamin C) are effective in treating virus diseases such as polyiomyelitis, measles and virus pneumonia; bacterial infections such as tuberculosis and scarlet fever; and cases of poisoning such as snake bite and lead poisoning. The range of antibiotic and antitoxic action is said to be unusually broad, and, in addition, there is claimed to be *complete freedom from allergic or toxic reaction.*

Intravenous or intramuscular injection is the preferred method of treatment. When so administered, ascorbic acid is said to compare favorably with sulfa drugs and mycelial antibiotics. Effectiveness of the therapy is reported to be dependent upon the potent oxidation-reduction action of ascorbic acid, which rapidly neutralizes viral or bacterial toxins.

Ascorbic acid occurs naturally in citrus and other fruits, as well as green leafy vegetables. One method of producing it synthetically is by using L-sorbose as the starting compound and employing *sodium methoxide* in the final (enolization) step of the synthesis.

Index of Chemical Patents Now Being Prepared

Every patent relating to chemistry which has been issued by the U. S. Patent Office since 1950 is being collected and indexed for reference purposes by a Washington information service. The collection is being kept current and is being made available on a subscription basis to chemical companies, libraries, educational institutions and other interested organizations.

At the moment, indices for 1955, 1956, 1957 and the first 10 months of 1958 are available. They cover 30,000 patents. A trained staff of chemists and biochemists is now working on the indices for 1950-1954, which will add another 40,000 patents. It is estimated that when this work is completed, in about two and one-half years, more than 100,000 patents will have been collected and indexed.

It is claimed that the indexing method used analyzes, edits, classifies and cross-indexes U. S. chemical patents into the fastest and most accessible reference system ever devised.

CONTINUED *Alcohol*

brucine sulfate. Consequently, there are now three new SDA 40 formulations approved by the Alcohol and Tobacco Tax Division. U.S.I. designations are shown in the box below.

U.S.I. Designations for New SDA 40 Formulas

SD-40-1M .....1½ oz. brucine alkaloid
SD-40-2M .....1½ oz. brucine sulfate
SD-40-3 .....1½ oz. quassin

U.S.I. Studying Alternate Denaturants

Because brucine and quassin derive from natural imported products, there is always the possibility that the supply of these denaturants might be inadequate at some future date. U.S.I.'s research laboratories are therefore continuing studies to develop suitable additional alternates.

Ideally, alternate materials suitable as denaturants should be synthetic and domestically produced. Once found and tested in end-use formulations, such stand-by alternates—pending approval by the government—would assure denatured alcohol consumers of an uninterrupted flow of raw material at all times.

Methionine-Hormone Formulation Effective For Treating Acne

Clinical studies have revealed that a formulation of DL-acetyl methionine, estrogenic hormone, colloidal sulfur and resorcin applied to the skin is effective for treating acne conditions.

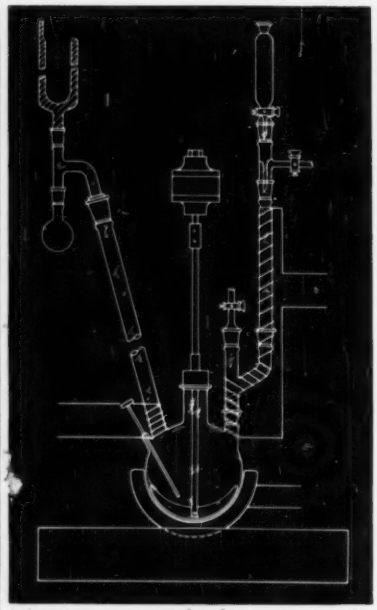
The medical research workers who conducted these studies found that methionine—the sulfur-bearing amino acid—and the estrogenic hormone act synergistically to reduce the excessive secretion of fatty materials from the sebaceous glands—a characteristic condition in acne cases. Consequently, the formulation dries and heals the acne lesions rapidly.

For optimum results, the treatment was supplemented with dietary and hygienic routines, and small oral doses of thyroid extract and estrogenic hormone.

Pure Sodium Alkoxides Can Be Made by Dry-Way Process

A new technical bulletin just released by U.S.I. describes a valuable but little-known technique for preparing sodium alkoxides from metallic sodium and alcohol vapors. This low-cost, dry-way process yields powders which are high-analysis alkoxide, in contrast to the 16-18% alkoxide solutions produced by the usual method of introducing sodium into liquid alcohols. It provides a way for pharmaceutical and other manufacturers who make their own alkoxides to get a high-purity material.

Products are almost identical in analysis to commercially available alkoxides. Although the bulletin describes the laboratory technique of passing vaporized alcohols over molten sodium, sufficient data is available to serve as a guide in designing a pilot plant.



Laboratory apparatus for dry-way preparation of sodium alkoxides.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

L-Methionine, labeled with both carbon-14 and deuterium (methyl-$C^{14}D_3$), can now be obtained for research purposes. This amino acid is reported useful in studying the mechanism of ergosterol. **No. 1430**

Cosmetic technology is discussed in new, 1450-page book now being sold. In 53 chapters, 61 experts cover over 3 dozen types of products. Includes technology, historic and legal aspects, physiology, testing, manufacture. **No. 1431**

Slide rule for chemists has special scales for solving pressure, temperature, solution concentration problems on one face, standard scales on other face. Gives atomic wts. of 52 elements, molecular wts. of 18 atomic groups. **No. 1432**

Chloromethoxypropyl mercuric acetate solutions now available in commercial quantity. Fungicidal and bactericidal activity claimed superior to phenyl mercuric compounds, due partly to presence of labile chlorine atom. **No. 1433**

Uses of stainless steel in CPI discussed in newly revised, 40-page free booklet. Sections on fields of plastics, detergents, nuclear power, others. Includes corrosion resistance table and table comparing stainless grades. **No. 1434**

Full line of polyesters for producing rigid or flexible urethane foams can now be obtained commercially. For rigid products, combinations of prepolymer and polyester are offered for foaming in place by mixing or spraying. **No. 1435**

Long-path infrared system recently developed is said to detect evaporation from one drop of a predetermined chemical in an average room. System senses the chemical by its IR spectrum, is not usually sensitive to other materials. **No. 1436**

Polyethylene work gloves now on market are claimed to provide protection without loss of fingertip sensitivity. Are lightweight, waterproof, resistant to most chemicals. Said to be suitable for use with radioactive materials. **No. 1437**

Comprehensive file of trademarks used by CPI here and abroad is now available for reference at a charge. Includes registered, unregistered, common, scientific, technological names. Composition, uses, producer given in many cases. **No. 1438**

New analytical-grade ion-exchange resins based on cellulose are claimed suitable for chromatographic fractionations of high-molecular-weight materials beyond range of conventional resins. Are extremely porous and hydrophilic. **No. 1439**

PRODUCTS OF U.S.I.

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OTHER PRODUCTS

Organic Solvents and Intermediates: Normal Butyl Alcohol, Amyl Alcohol, Fusel Oil, Ethyl Acetate, Normal Butyl Acetate, Diethyl Carbonate, DIATOL®, Diethyl Oxalate, Ethyl Ether, Acetone, Acetoacetanilide, Acetoacet-Ortho-Chloranilide, Acetoacet-Ortho-Toluide, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chloroformate, Ethylene, Ethyl Sodium Oxalacetate, Sodium Ethylate, ISOSEBACIC® Acid, Sebacic Acid, Urethan U.S.P. (Ethyl Carbamate), Riboflavin U.S.P., Pelargonic Acid, 2-Ethyl Heptanoic Acid.

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Animal Feed Products: Antibiotic Feed Supplements, BHT Products (Antioxidant), Calcium Pantothenate, Choline Chloride, CURBAY B-G®, Special Liquid CURBAY, VACATONE®, Menadione (Vitamin K_3), DL-Methionine, MOREA® Premix, Niacin USP, Riboflavin Products, Special Mixes, U.S.I. Permadry, Vitamin B_{12} Feed Supplements, Vitamin D_3, Vitamin E Products, Vitamin E and BHT Products.

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FIELD REPORT

TO: B.D.

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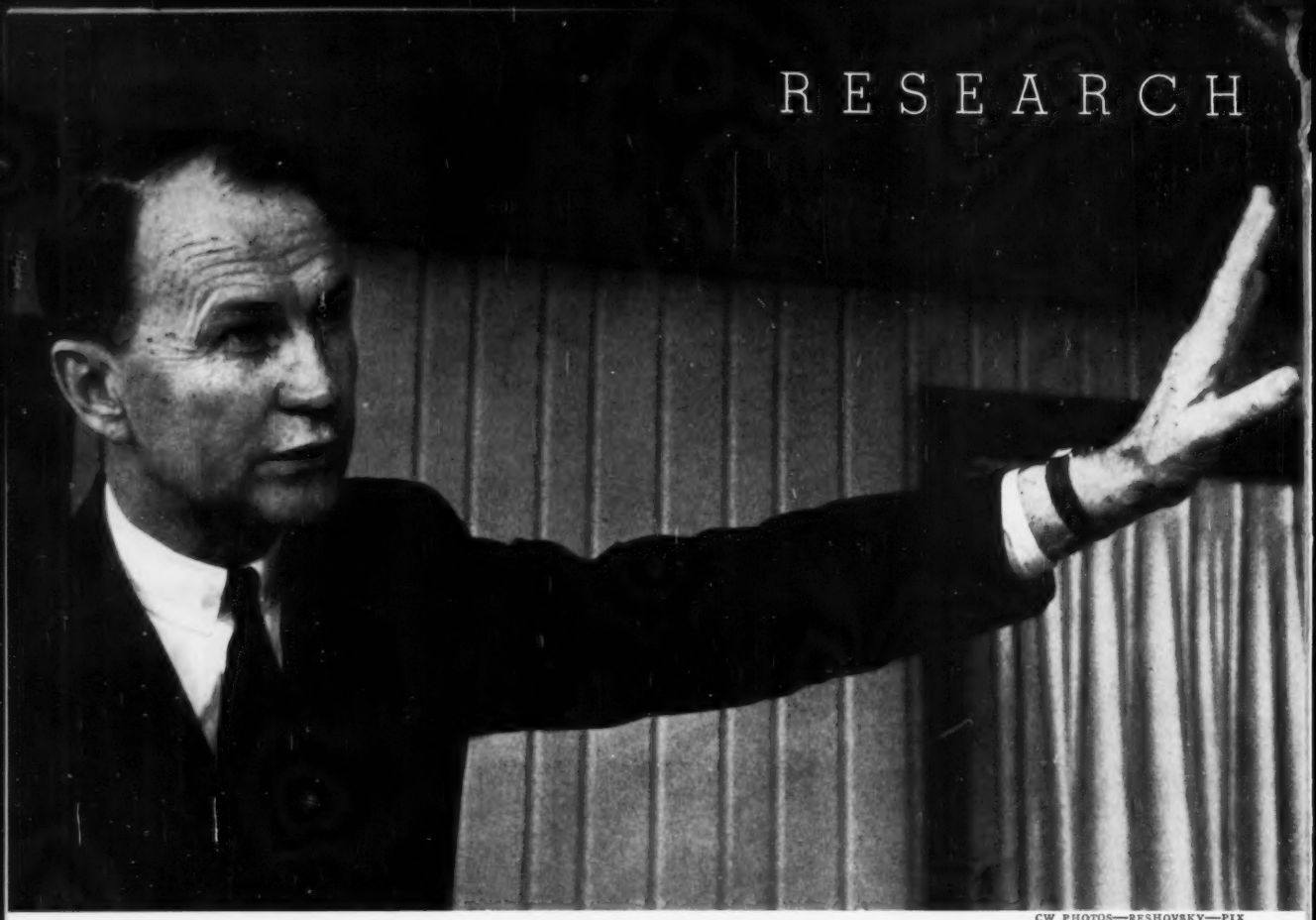


CW PHOTOS—RESHOVSKY—PIX

'Our missile and space technology is one of the most significant economic entities of our time. But there is great need for corporate planning to convert this to commercial use,' says Gavin.

Prophet of Space-Age Profits

At meetings in San Francisco and Los Angeles last week, former Army research and development chief James Gavin tempted representatives of 40 defense-oriented companies with the promise of civilian profit from military research. His message: the time is ripe to start research on commercial applications of space-age technology.

Ultimately, such uses will prove more profitable than purely military research, Gavin believes. And civilian products born of the new technology are needed not only to broaden (and thereby stabilize) the sales of defense firms but also to strengthen the country's economy.

Gavin, a vice-president of Arthur D. Little, Inc., stresses the need for corporate planning as a prerequisite for tapping civilian markets—planning that may require establishment of a separate group, even a separate company, to handle commercial products. That's necessary for bookkeeping reasons and because of the big difference in problems and philosophy between defense and commercial industries.

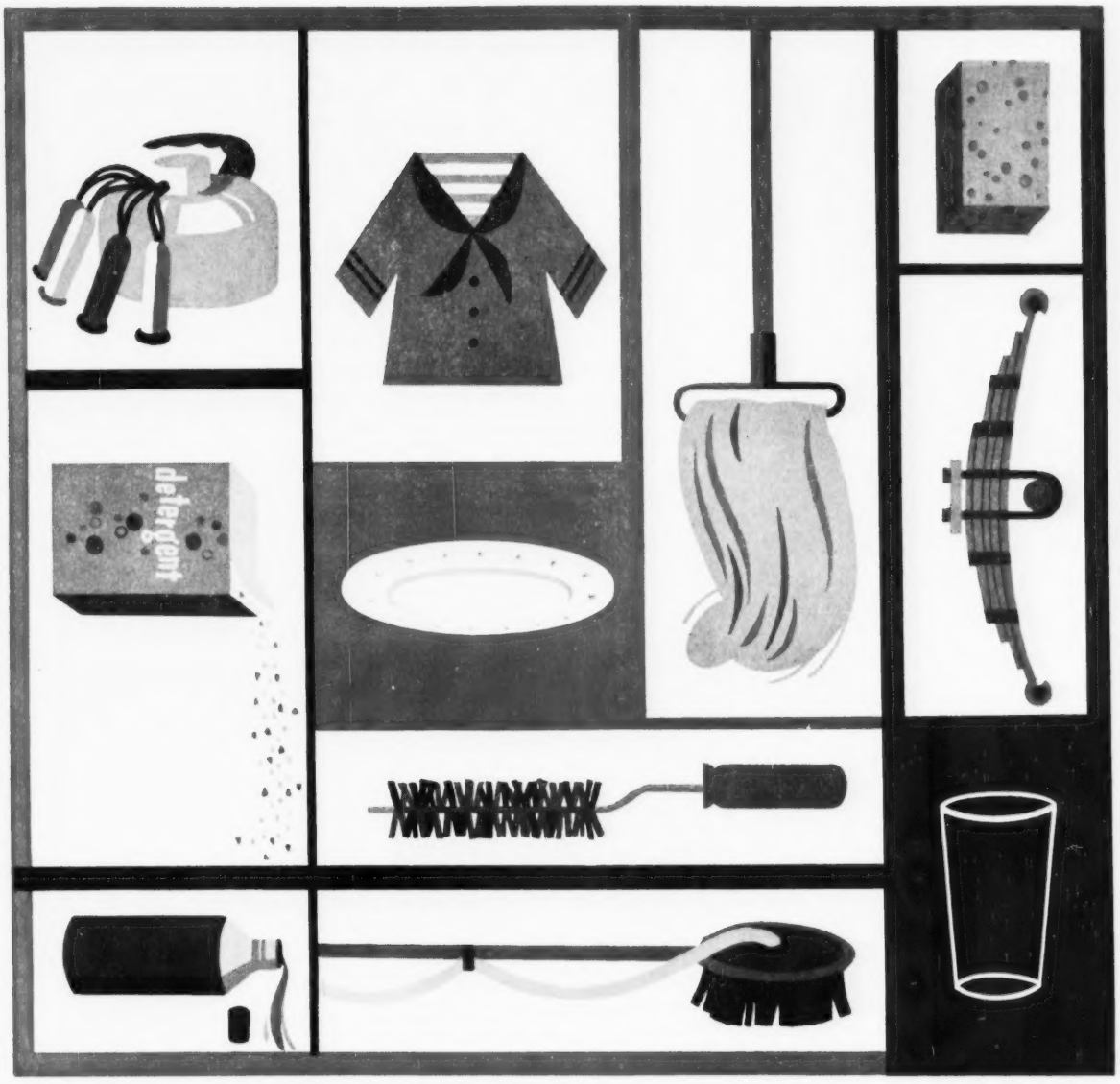
To a number of chemical process firms that lean heavily on defense orders, Gavin's warning comes as no revelation.

Thiokol Chemical Corp., Callery Chemical Co. and Metal Hydrides are examples of such companies that are gearing for civilian markets. Thiokol, which does 85% of its business with the government, handles civilian products exclusively in its chemical division (sealants, urethanes, etc.). This division frequently picks up products uncovered through government-sponsored research in one of the firm's other (e.g., polymer) divisions. Last spring, Thiokol acquired Hunter-Bristol Engineering Co., a division now specializing in finding new civilian uses for rockets.

Callery and Metal Hydrides share the problem of being heavily defense-oriented in boron chemicals. But they're both driving for more civilian products. Recently, Metal Hydrides introduced sodium and potassium borohydrides in pellets and water solution for cleaning up aldehyde traces in oxo-alcohol manufacture (*CW, Dec. 27, '58, p. 64*). Callery also offers a range of commercial boron chemicals.

Taylor Fibre Co. (Norristown, Pa.), which has worked on missile nose cone laminates and also silicone glass laminates (for the Bureau of Ships), is looking for more outside contracts in the laminated plastics field.

Some companies, finding themselves deep in both government and civilian research, are handling the problem by splitting off the government portion as a separate activity. Crane Co. has formed a subsidiary, Corwith Corp., to handle government-



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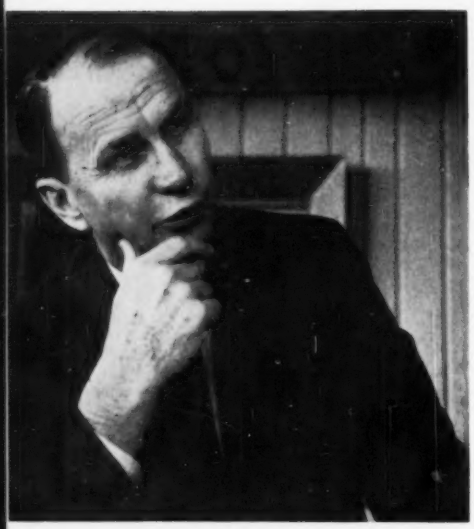

'Examples of application of our space-age technology . . .

sponsored research and development —such as AEC work on nuclear reactors—to avoid mixing this activity with Crane's valve and other manufacturing operations. About a year ago, U. S. Borax & Chemical Corp. set up U. S. Borax Research Corp. as a subsidiary to handle classified research contracts.

Gavin doesn't offer specific cases in which companies are shifting to more civilian research. He does generalize the problem this way: "We are today, in the missile and space industry, where the aircraft industry was about 40 years ago. The first thoughts on the uses of the airplane were its possible military employment. Few foresaw its great commercial potential."

Routes to Riches: But Gavin does volunteer ideas on what broad aspects of the new technology are likely to prove profitable. He can see big commercial profits materializing primarily in two CPI areas—extremely high- and extremely low-temperature technologies. Neither field was intensively tilled until the advent of multibillion-dollar government-sponsored missile research programs. But under the goad of Soviet missile competition, both of these research regions have been opened.

Gavin's own firm has been active in cryogenics research. He expects that A. D. Little's work on devices for cooling electronic systems to liquid helium temperatures will prove particularly profitable.

Such refrigerators are needed to achieve superconductivity in metals. They make possible the operation of cryotrons (tiny electrical switching devices that operate at liquid helium temperatures). A simple cryotron consists of a strand of niobium wire wrapped around a strand of tantalum wire. Cryotrons permit construction of extremely compact computers. The performance of 10 radio tubes can be duplicated by cryotrons in a space 1/8 in. by 1/4 in. by 1/2 micron.

Gavin also sees a bright future for another offspring of space-age technology—a flame device for oil well drilling that is now getting trials in the U.S. and Russia. One version feeds a metal tube (the metal is fuel) into an oxygen stream, producing a 2000 C flame that is hot enough to melt granite. Another burns kerosene and oxygen in a 3500 C jet.

'include materials for use under extreme temperatures . . .

He also stresses indirect advantages to be derived from more research in these areas: "When we are able to apply the technology of our missile and space programs to the many possible commercial uses, we will receive an increasing amount of support for these programs."

It Pays to Be Big: Tapping into the potential of space research, however, requires that a firm first garner government contracts. These often go to the large, well-equipped companies. Gavin tells *CW* there's a trend by smaller firms to group together in bidding on contracts.

This situation has been getting a close look lately by the Senate Small Business Committee, which notes that small businesses were awarded only 3.7% of total prime contract dollars in research and development for fiscal '58 (ending June 30). The committee proposes that the government should separate research and development contracts from production contracts. In rebuttal, the Defense Dept. points out that small companies are getting $7 billion/year in R&D contracts, using payments made by large contractors to small firms, as well as the dollar value of contracts awarded directly to small companies, to arrive at that figure.

In Gavin's message, CPI companies can find a twofold incentive for commercializing their missile research: enlightened self-interest; and service to the nation. In his own words, "I would like to emphasize the great need for corporate planning, corporate planning that will convert our missile and space technology to commercial usage. This will not only ensure our being in the lead in the economic struggle in which we are engaged but will also ensure our

'and improvements in systems for high-speed data handling.'

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- Chlorbenzene
- Chloroform
- Dibutyl Phenol
- Dibutyl Phthalate
- Dicapryl Phthalate
- o-Dichlorbenzene
- Diethanolamine
- Diethylene Glycol
- Dimethyl Phthalate
- Dimethyl Sebacate
- Dipropylene Glycol
- Dodecyl Alcohol
- Dodecylbenzene
- Ethyl Acetate
- Ethylene Dichloride
- Ethylene Glycol
- Ethyl Hexanediol
- Ethyl Lactate
- Glycerine
- Glycol Ethers
- Hexyl Alcohol
- Iso-butyl Alcohol
- Isodecyl Alcohol
- Iso-octyl Alcohol
- Isophorone
- Isopropyl Acetate
- Isopropyl Alcohol
- Methyl Alcohol
- Methyl Amyl Alcohol
- Methylene Chloride
- Methyl Ethyl Ketone
- Methyl Hexyl Ketone
- Methyl Isobutyl Ketone
- Monoethanolamine
- Naphthas
- Nitrotoluols
- Nonyl Phenol
- Octyl Acetate
- Perchlorethylene
- n-Propyl Alcohol
- Propylene Glycol
- Pyridine
- Toluene
- Trichlorbenzene
- Trichlorethylene
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Lacquer, 25°C., 14 days	Very slight softening
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RESEARCH

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"This is the essence of our problem; the maintenance of a dynamic growing economy, and the development of a missile and space program second to none; and it is to these that industry should address itself with purpose and resolution now."

Benign Pain-Killer

A new narcotic turned up at the National Institutes of Health could well be the much-sought addiction-free successor to morphine (*CW, May 31, '58, p. 41*). Chemically, it is 2'-hydroxy - 5,9-dimethyl-2-phenethyl-6,7-benzomorphan hydrobromide, tabbed NIH 7519 in clinical trials.

Arthur Flemming, Secretary of Health, Education & Welfare, says the drug is 10 times as effective as morphine but appears to be less addicting and safer to use. It is 50 times as effective as codeine, according to Flemming.

Although more than 200 persons have tested the drug in clinics in Philadelphia, New York and Los Angeles, Flemming warns that the drug is still in the experimental stage. Patent rights have been assigned to the U.S. government by the developers, Everette May and Nathan Eddy, both of the National Institute of Arthritis and Metabolic Diseases.

EXPANSION

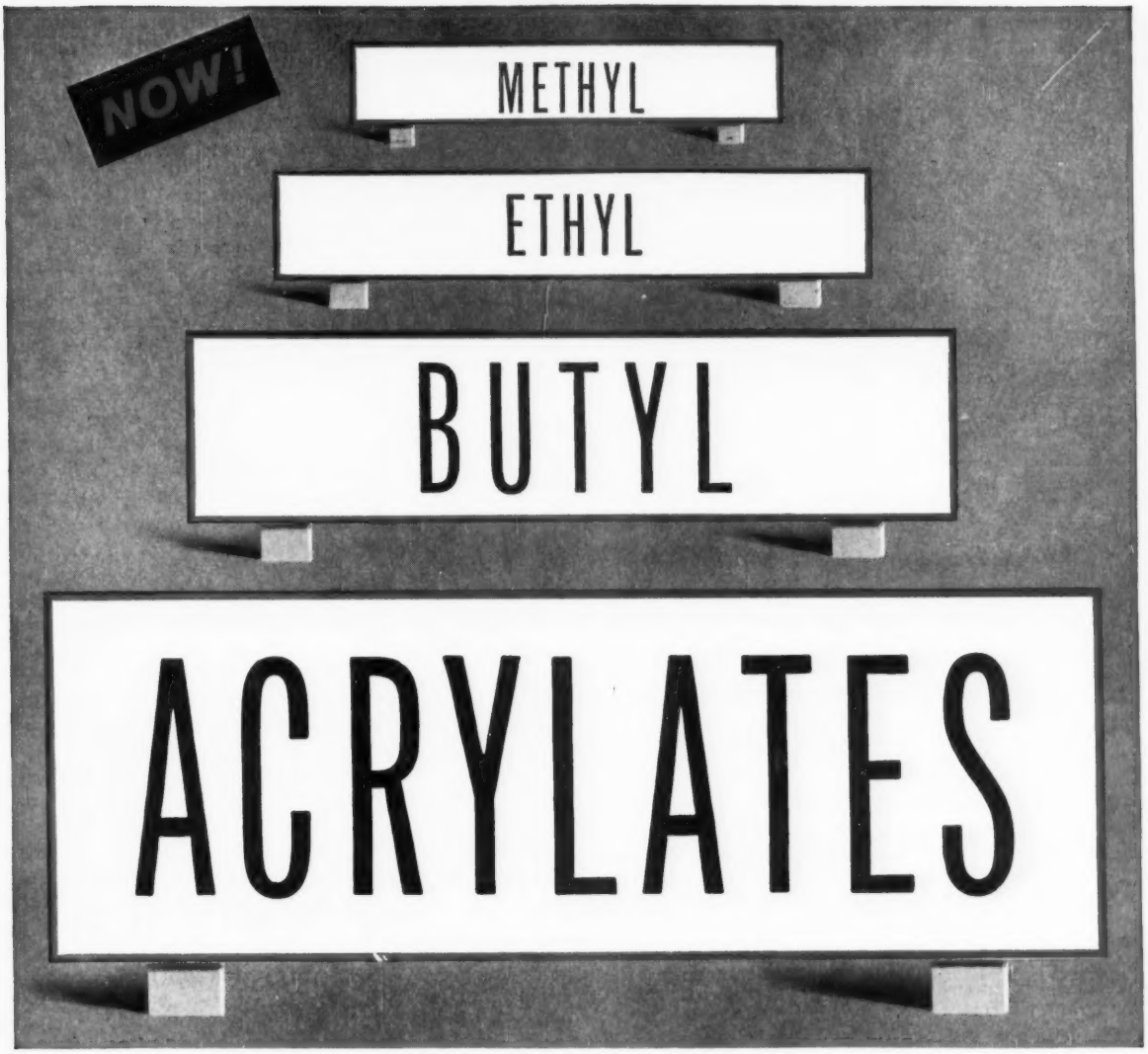
• Harbison-Walker Refractories Co. (Pittsburgh) has opened its new Garber Research Center on the outskirts of Pittsburgh. Research facilities at Hays, Pa., will now be exclusively used for quality-control work.

• American Smelting and Refining Co.'s Enthone Division (New Haven, Conn.) has completed its new research laboratory at New Haven. The firm will increase activities in the development of metal-finishing compounds, metal-treating processes.

APPARATUS

High-Temperature Chromatograph: A new high-temperature chromatograph capable of separating and analyzing substances with boiling points up to 600 C is available from Consolidated Electrodynamics Corp. (Pasadena, Calif.). The unit, called

CELANESE—growing in Monomers



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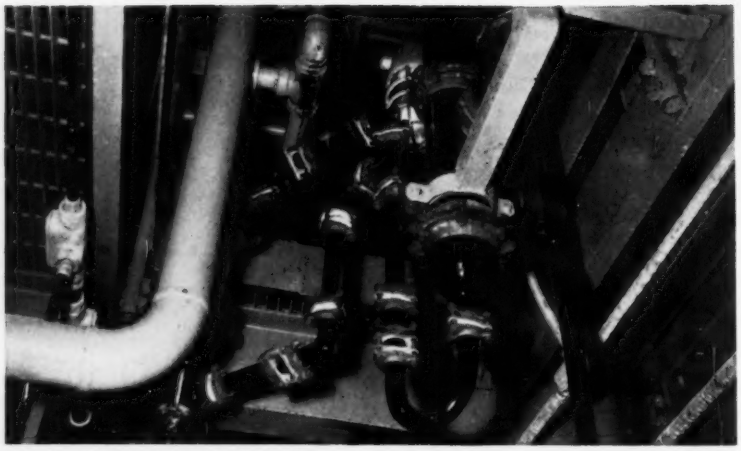

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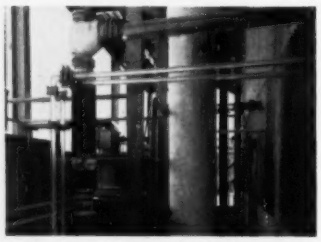

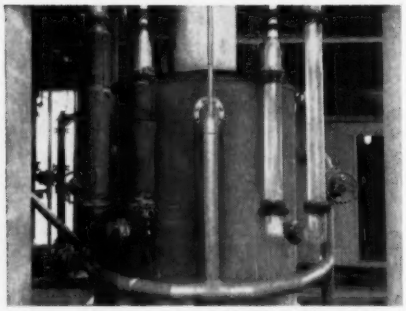

2. You can use PYREX Pipe outdoors, too, even where ambient temperatures differ widely from those of fluids handled. 3. You can keep constant visual check on flow because PYREX Pipe is transparent. This lets you see blockage, or other problems, before extensive damage is done.

A lot of bromine means a lot of glass

Michigan Chemical depends upon PYREX® Pipe to safeguard its bromine output

You would hardly attempt to make bromine in the laboratory in anything but glass—and probably glass bearing the PYREX trademark.

Naturally enough, when Michigan Chemical Corporation built its new El Dorado, Arkansas, plant, in cooperation with the Murphy Corporation, a lot of PYREX Pipe footage was installed.

Much of the glass pipe is used to deliver bromine from the Kubierschky extraction towers. The rest is used to handle hot acidified brine and ethylene bromide.

If you have ever had anything to do with the manufacture of bromine —or with any such corrosive process— you know what Mr. Clayton Carter, Plant Manager, means when he says, "PYREX Pipe is one of the few materials we have found that will withstand the extreme corrosion."

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PYREX Pipe is no more difficult to install than any other piping. For one thing, it's lighter, easier to handle, takes fewer hangers. There are no expansion joints, no lead pouring. All that is needed is a wrench and a good strong right arm. It doesn't have to be babied.

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PYREX Pipe is rugged. It's chemically inert. It withstands extremes of thermal shock. Add these up and you have the reasons a PYREX Pipe installation costs so little—*just because it lasts so long.*

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Automatic Balance Reader: The National Bureau of Standards (Washington, D.C.) has developed a photoelectric device that automatically and continuously indicates the "at rest" position of the swinging beam of a high-precision balance.

LITERATURE

• "Yield Determination by Use of Radioisotopes" is the subject of Technical Bulletin 1 in a new series available free from Nuclear-Chicago Corp. (Chicago). It details the application of radioisotopes to yield determination problems, outlines proper procedures.

• "Inorganic Fibers," a new book being published this month, will include sections on asbestos, glass, minerals, metals—with special attention to asbestos. Author: Charles Z. Carroll-Porczynski. The book is available for $11 from Academic Press (New York).

• "Research and Technical Assistance for the Smaller Industries of New York State" is a booklet aimed at acquainting small-business men with the research talents and facilities available at educational institutions in New York. It is available free from Associated Industries of New York State, Inc. (30 Lodge St., Albany 7, N. Y.)

• A technical bulletin on the physical characteristics and purity standards of germanium and germanium dioxide is available free from Sylvania Electric Products, Inc. (Towanda, Pa.).

• A 107-page scientific literature bibliography on silicon carbide has been compiled by the Research and Development Division of The Carborundum Co. Copies are available free from the Advertising Distribution Section, The Carborundum Co. (Niagara Falls, N. Y.).

• Lange's "Handbook of Chemistry," now in its ninth edition, will hereafter be published by McGraw-Hill Book Co. (New York). McGraw-Hill has purchased Handbook Publishers Inc. (Sandusky, O.), including rights to titles, inventories and copyrights to Handbook's five scientific books now on the market.

Basic Chemicals From Reichhold

FORMALDEHYDE_

An important raw material in the manufacture of resins, adhesives, textiles, leather, rubber and numerous other products. It is marketed by RCI in five different concentrations.

GLYCERINE_

Used in the manufacture of synthetic resins, pharmaceuticals, cosmetics, food products and as a humectant.

PENTACHLOROPHENOL_

Used in various fungicides, bactericides, algicides and herbicides; in agriculture, lumber, pulp and paper applications.

PHENOL_

A building block in the plastics industry. Also widely used in the intermediates required for the production of synthetic detergents, lubricating oil additives, insecticides, bactericides and pharmaceuticals.

SODIUM PENTACHLOROPHENATE_

The water soluble salt of penta used to prevent microbiological attack on such organic substances as wood, adhesives, protein materials.

MALEIC ANHYDRIDE_

Principally used in the manufacture of synthetic resins, synthetic drying oils, and related products. Its highly reactive structure lends itself to the synthesis of complex organic chemicals by the Diels-Alder Process.

ORTHOPHENYLPHENOL_

A very effective fungicide and bactericide used in many industrial applications for outstanding preservation.

HYDROCHLORIC ACID_

Has wide application in the chemical industry for pickling and cleaning metals, processing textiles, refining ores and in the manufacture of chemicals generally.

PENTAERYTHRITOL_

Used primarily in the manufacture of alkyd resins. Imparts better film properties such as high gloss and gloss retention, good durability, faster drying. Used also in ester gums and synthetic drying aids.

METHANOL_

A widely used solvent and chemical intermediate for the manufacture of formaldehyde, rocket fuels, amines and esters.

Creative Chemistry . . . Your Partner in Progress

RCI

PHTHALIC ANHYDRIDE_

Used extensively in the manufacture of alkyd resins, plasticizers, organic pigments and dyestuffs, and pharmaceuticals, as well as other fine chemical intermediates.

SODIUM SULFITE_

Primarily used by the paper industry in the manufacture of kraft paper and fiber board by the semi-chemical hard wood process.

SEBACIC ACID_

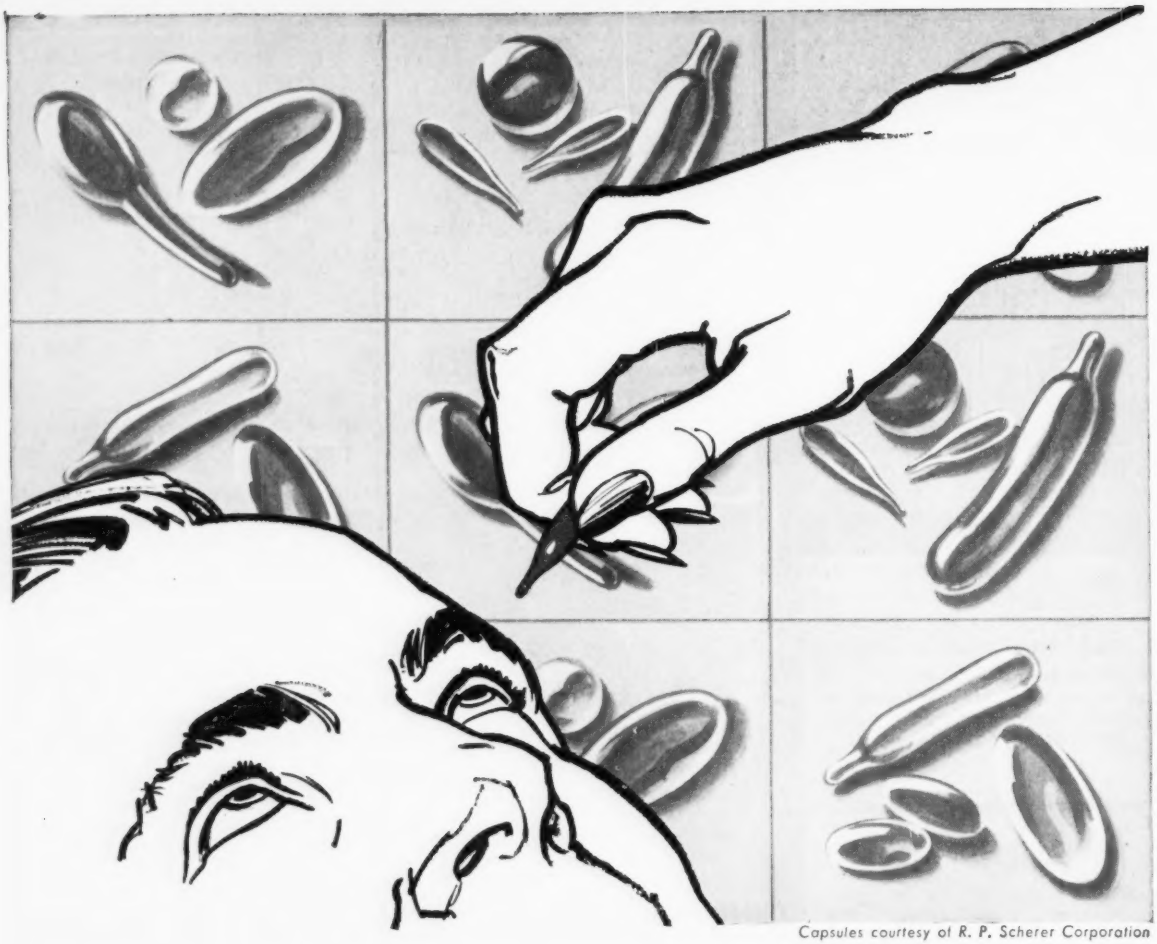
Sebacic acid esters are finding increased usage as plasticizers for PVC systems and as safe, non-flammable jet engine lubricants.

SULFURIC ACID_

A basic commodity used in the paper, dye and pigment, textile, fertilizer and organic chemical industries.

REICHHOLD

REICHHOLD CHEMICALS, INC., RCI BUILDING, WHITE PLAINS, N. Y.



Capsules courtesy of R. P. Scherer Corporation

For plasticity in "one-shot packages"

One-shot capsules for pharmaceuticals, foods, adhesives, oils and dozens of other products are plasticized with Glycerine. They are easy to squeeze or swallow. They remain soft and flexible under varying conditions of heat, cold and humidity.

Where capsules are for human consumption, freedom from toxicity is essential. Here again, the safety, compatibility, taste and acceptability of Glycerine are advantages difficult to match in any other plasticizer.

Glycerine is stable in price, dependable in supply. Its usefulness continues to grow. Our 18-page booklet, "Glycerine Properties and Uses," may suggest applications to you. Address your request to the Glycerine Producers' Association.

Properties

HYGROSCOPICITY • STABILITY

SOLVENT POWER • VISCOSITY

NONVOLATILITY • NONTOXICITY

TASTE • COMBINING WEIGHT

ADVANTAGES THAT COME WITH . . .

Glycerine

Applications

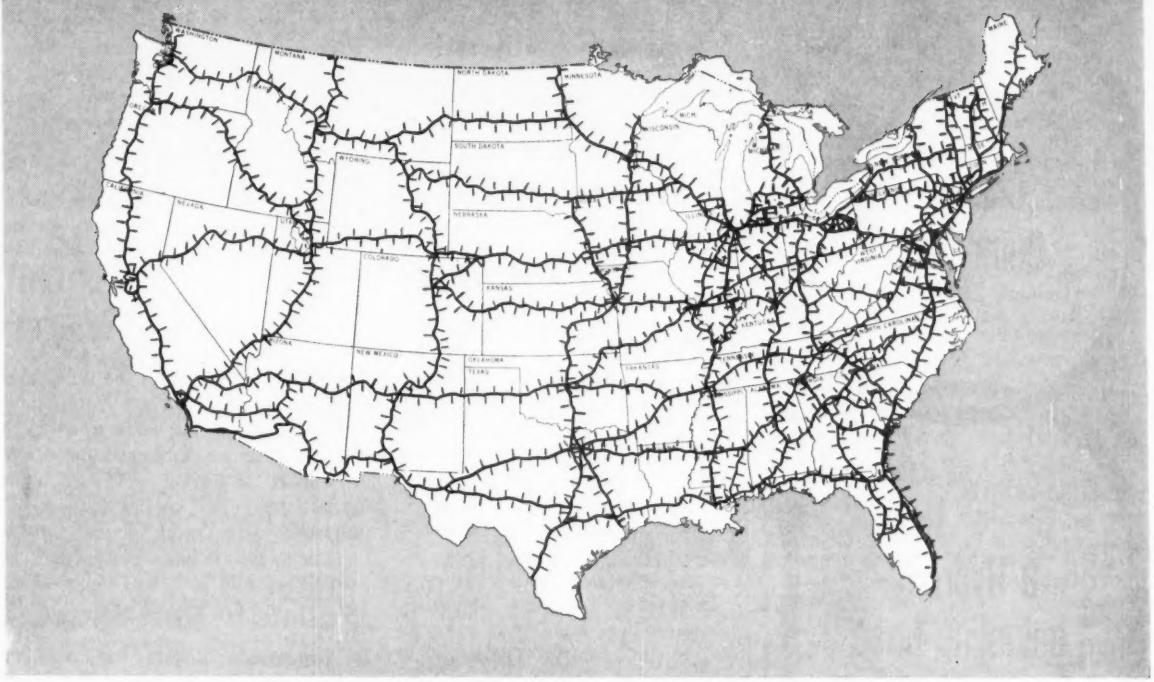
HUMECTANT • CARRIER

SOLVENT • LUBRICANT

SOFTENER • EMOLLIENT

ANTI-FREEZE • ALKYD BASE

GLYCERINE PRODUCERS' ASSOCIATION • 295 MADISON AVENUE, NEW YORK 17, N. Y.



NATIONWIDE CAMPAIGN by 3M blankets major highways with 1,366 billboards at sites shown on map.

PRODUCT PROMOTION for 12 divisions is done by four individual signs every 200 miles.

INSTITUTIONAL billboards to build corporate identity are located at 250-mile intervals

Big Billboard Campaign Builds Identity

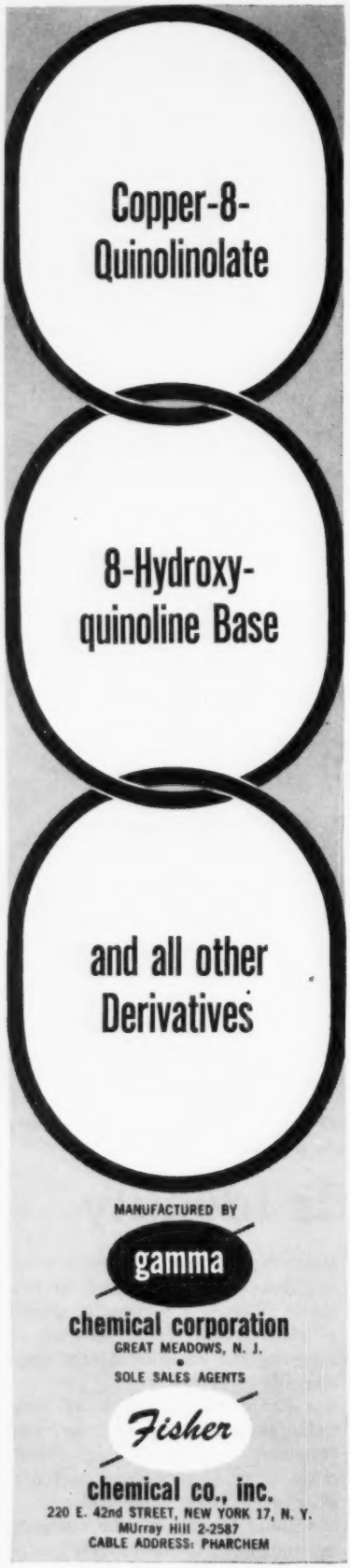
This week some 17 million motorists—in spots as isolated as barren Utah desert and icy Wisconsin roads—are the targets of a unique institutional billboard-advertising campaign by a chemical process company, Minnesota Mining & Manufacturing Co.

The company has placed 1,366 large, full-color, reflectorized 3M signs on key highways. And the program has proved so valuable as to warrant extension until at least '63.

Many chemical process firms make only limited use of billboard promotion. That's because their major customers, industrial chemical companies, are better reached by other media—business magazines, for example. For years, they have used highway signs mainly for promoting farm products and consumer-type chemicals, such as antifreeze. For identity-building institutional promotion, large producers have traditionally relied on national radio and TV and consumer magazine advertising.

Minnesota Mining turned to billboard advertising because it affords a relatively inexpensive method of achieving the company's three basic objectives:

- Reach vast numbers of nontechnical people who are potential customers for 3M products (which range from surgical tape to tombstone sandblasting compounds).
- Build identity for the company by establishing the firm as the brand-



name manufacturer of well-known products.

• Help transfer product loyalty from a few well-known 3M products to the firm's other products and the company itself.

Big Blast: The big institutional campaign is spread over some 41,000 miles of mainline highways. These are the principal through-arteries (other than turnpikes, which usually ban billboards). The roads chosen handle about 90% of all intercity traffic.

Site location figured prominently in promotional planning. Deliberately, 3M chose locations away from areas already heavily billboarded. Result: most 3M signs are placed outside towns or cities or in isolated rural locations (farm, desert and forest areas).

In its campaign, 3M uses two types of billboards, 1,088 signs advertising specific products and 278 carrying an "institutional" message. The latter (27 ft. high and 32 ft. wide) are considerably larger than the product signs (22x16 ft.).

In any given 250-mile stretch of "mainline" highway, the motorist sees four product signs followed by one institutional sign. In the next 250 miles, the procedure is repeated with four different product signs and another institutional. The company reckons the average motorist passes one sign hourly at normal driving speeds.

The mixture of product and institutional signs is, of course, deliberate. Product signs link specific items to 3M; the institutional signs associate the products under a single corporate umbrella. The slogan "Research Is the Key to Tomorrow" is prominently carried on many of the signs. Moreover, the signs are in a characteristic, identity-building form — a large key with the 3M symbol (*see cut*).

Impact: The company figures that 65-70 million individuals travel each month along the highways where its signs are situated, and see at least one sign. Other traffic analyses indicate that each sign is seen about 350 million times each month, including repeat viewings.

Cost for a three-year period will be approximately $720,000. That works out to 15-20¢/1,000 persons reached by the billboard message and compares favorably with more expensive —but more versatile—consumer magazine and television promotion. The cost of reaching nontechnical people is low enough to permit 3M to run additional ad campaigns—using many types of media—to reach specific audiences.

Effectiveness: What return is 3M realizing from its massive use of the nation's highways? Because precise measurements of billboard effectiveness are generally nonexistent, 3M is gauging the payoff largely from the comment it receives. One regional 3M sales manager summed it up this way: "I've heard more about the signs than I have about any other institutional promotional scheme we've tried."

Comments like that encouraged 3M to extend the use of signs. And three other companies, 3M has learned, are seriously considering similar cross-country ventures.

Pallets in New Shape

Expendable pallets for stacking multiwalls took a new form this week with introduction of new units made from wood-reinforced corrugated paperboard. The pallets, developed by the Calaveras Cement Co. (San Francisco), can handle three dozen 94-lb. bags of cement and can be stacked three tiers high. They consist of a thin flat base with two raised channels for fork entry.

Calaveras will market the units through a newly formed subsidiary, envisions substantial markets in the CPI. Unit price, says the firm, will be "considerably less than a dollar" and will make the pallets readily expendable. That will make it a tough competitor for other disposable paper, paperboard and wooden pallets.

DATA DIGEST

• **Acetal Resins:** New booklet discusses polyvinyl butyral and formal applications in wire enamels, surface coatings, adhesives, textile and strip coatings, molding and extrusion and printing inks. Numerous charts and tables give physical and chemical properties and typical formulations. Shawinigan Resins Corp. (Springfield, Mass.).

• **Hydrocarbons, Sulfur Chemicals:** 136-page catalog tabulates specifications, typical properties, packaging information and other data for large range of hydrocarbons and organo-

Progress Report...

— Urethane solvents
— Alkylene amines
— Gas dehydrating

And now, polyurethane lacquers

Polyurethane lacquers are creating great interest in the surface coatings industry. A properly formulated lacquer produces a coating that is hard and tough . . . and has excellent resistance to abrasion, corrosion, and weathering. These coatings can be applied by spray or brush and have potential value in almost every consumer and industrial application.

A critical problem in formulating urethane lacquers is the quality of the solvents used. If the urethane reacts with acid or water in the solvent system, carbon dioxide may be formed ...thus creating bubbles in the coating.

To meet the high purity solvent requirements for urethane lacquers, CARBIDE is marketing two new acetate solvents—CELLOSOLVE Acetate, 99% (Polyurethane Grade), and Ethyl Acetate, 99.5% (Polyurethane Grade). Water content is kept below 0.05% by weight and free ethanol does not exceed 0.01% by weight. Thus, reactive hydrogen is kept to a minimum.

Here are the complete specifications that must be met before CELLOSOLVE Acetate, 99% and Ethyl Acetate, 99.5% are shipped to you.

	CELLOSOLVE Acetate, 99% *	Ethyl Acetate, 99.5% *
Purity, % by wt., min.	99.0	99.5
Acidity (as acetic), % by wt., max.	0.02	0.0005
Water, % by wt., max.	0.05	0.05
Free Ethanol, by diff., % by wt., max.	None	0.01
Nonvolatile matter, % by wt., max.	None	0.01
Color, Pt-Co, max.	15	10
Distillation, 760 mm Hg		
1 bp, min.	150.0° C.	75.5° C.
Dp, max.	160.0° C.	78.0° C.
Odor	Mild	Esteric, fruity and non-residual

*Polyurethane Grade

For further information, check the coupon for CARBIDE's technical information bulletin on Urethane Solvents.

Reminder to drug makers

Numerous pharmaceutical products can be synthesized from alkylene amines. Solutions of aminophylline, a salt used for treating cardiac ailments, can be prepared from ethylene diamine with theophylline. The ethylene diamine also serves to stabilize the solution.

Antihistamines and imidazoline derivatives, used for treatment of circulatory disturbances, can be obtained by using ethylene diamine and substituted ethylene diamines as starting materials. Many other types of pharmacologically active agents can be prepared from alkylene amines. More information on these useful CARBIDE chemicals can be found in a new booklet, available now. Check the coupon for your copy.

Gas dehydrating with glycols

Natural gas produced from most wells contains water. Both the liquid phase and the water vapor must be removed in order to prevent the formation of hydrocarbon hydrates which would block gas transmission lines. The easiest and most common way to do this is by passing the gas through a glycol solution.

Both diethylene and triethylene glycols are used to remove moisture from natural gas before it enters the pipeline. Triethylene glycol is also used as a liquid desiccant in small packaged plants at the gas well head to eliminate the need for alcohol injection or line heaters in field gathering systems.

Dehydration units using diethylene glycol and triethylene glycol have the advantages of low investment cost and simplicity of operation. A further advantage is that glycols are not corrosive to the carbon steel used in gas field equipment. Thus, most glycol units operate without trouble year in and year out.

CARBIDE maintains an extensive engineering service group to help natural gas producers get the best possible gas dehydration efficiency with CARBIDE's diethylene glycol and triethylene glycol. As a part of this service, a comprehensive bibliography of articles devoted to improving gas dehydration operations is available. Compiled by CARBIDE, this publication lists every major article on gas dehydration since 1931. To obtain a copy, check the coupon for Technical Information Bulletin F-9289.

Tear out this coupon. Check the boxes on which you'd like more information, and mail to Dept. H, Union Carbide Chemicals Company, 30 East 42nd Street, New York 17, N. Y.
☐ Urethane Solvents. ☐ Alkylene Amines.
☐ Bulletin F-9289 (Gas Dehydration).

Name _____
Company _____
Street _____
City _____ Zone ____
State _____

And remember, there is a CARBIDE sales office near you where you can obtain the services of a CARBIDE Technical Representative. His wide industry experience is backed both by extensive chemical training and by Technical Specialists.

"Cellosolve" and "Union Carbide" are registered trade marks of Union Carbide Corporation.

UNION CARBIDE CHEMICALS COMPANY
DIVISION OF
UNION CARBIDE
CORPORATION

EASTERN MIXERS

mix fluids quickly . . . thoroughly

EASTERN'S COMPLETE LINE of fluid mixers range from fixed-mounted 40 H.P. turbines and heavy-duty propeller mixers to lightweight portables. Where fixed-mounted installations are not required, Eastern Portables offer versatility, ease of handling and long-term cost savings.

Portables are available with speeds of 420, 1125 and 1725 R.P.M., rated from 1/20 to 3 H.P. as standard, with variable speed and air-driven models also available. Motors in all standard types can be supplied in open drip-proof, totally-enclosed, or explosion-proof construction. Shafts and single or dual propellers are available in a choice of alloys for all service requirements. New optional ball-swivel clamp as illustrated, permits easy adjustment of mixer position in tank.

For a personalized analysis of your mixing problems, send details to Eastern engineers. A recommended solution will be furnished promptly and without obligation. For a helpful guide to mixing fundamentals, write for "Handbook of Fluid Mixing."

SIDE-ENTERING MIXERS
Handle the extra heavy-duty jobs in big tanks. Sizes ¼ to 30 H.P. Send for Bulletin 620.

TOP ENTERING MIXERS
Designed for heavy-duty applications requiring agitators from ¼ to 10 H.P. Send for Bulletin 620.

TURBINE MIXERS
Range of ¼ to 40 H.P. solve many special mixing problems. Send for Bulletin 1210.

NEW PORTABLE MIXER BULLETIN

Eastern's improved line is included in the revised Bulletin No. 530.

Eastern INDUSTRIES, INC.
Dept. A-1. Norwalk, Conn.

EASTERN INDUSTRIES MIXER DIVISION

SALES

sulfur compounds. Phillips Petroleum Co., Special Products Division (Bartlesville, Okla.).

• **Plasticizer:** Folder describes light-colored epoxidized ester, Peroxidol 781, for applications in vinyl technology. Includes data on volatility and heat- and light-stability. Reichhold Chemicals (White Plains, N. Y.).

• **Phosphorus Pentasulfide:** 14-page booklet, SD 71, outlines safe handling practices, suggests precautionary measures, and describes protective equipment, containers and waste disposal methods. Manufacturing Chemists' Assn. (1625 "Eye" St., Washington 6, D. C.).

• **Fatty Acids:** Folder tabulates specifications and end-uses for stearic, oleic, hydrogenated, vegetable and animal fatty acids and glycerides. Emery Industries (Carew Tower, Cincinnati).

• **Ion Exchange:** Book offers detailed review of theory, applications, test procedures and laboratory methods. Copies available to departmental libraries. Dow Chemical Co. (Midland, Mich.).

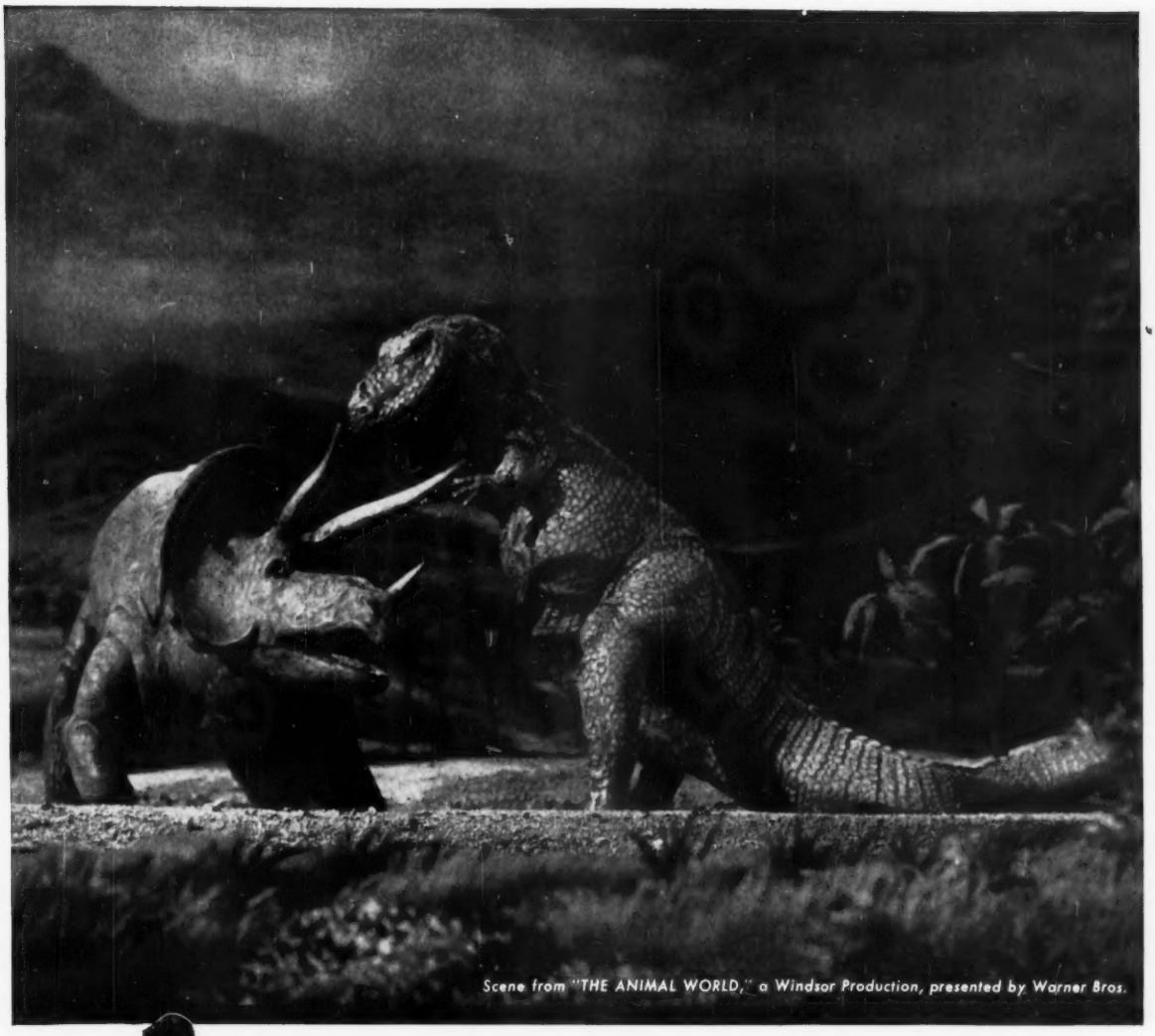
• **Polymer - Resin Systems:** New bulletin treats liquid polymer/epoxy resin systems from standpoint of flexibility, impact and chemical resistance, material selection and compounding agents. Thiokol Chemical Corp. (Trenton 7, N. J.).

• **Acrylic Coating Solutions:** Applications in adhesives, enamels, vinyl top coatings, luminous paints and aircraft lacquers are stressed in 16-page brochure delineating company line of acrylic ester resins. Rohm & Haas Co. (Philadelphia).

• **Fabric Chemical Resistance:** Booklet gives comparison of chemical resistance of nine types of synthetic fabrics and films used in safety clothing. Milburn Co. (3246 East Woodbridge, Detroit 7).

• **Aliphatic Chemicals:** Catalog lists physical properties of alkanes, olefins, saturated higher alcohols, alkyl halides, mercaptans and ethers and alkenyl succinic anhydrides. Includes brief review of chemical properties. Humphrey-Wilkinson, Inc. (Devine St., North Haven, Conn.).

• **Organometallics:** More than 200 compounds are described in new catalog listing derivatives of metals, boron and silicon. Physical constant data, container sizes and prices are included. Anderson Chemical Co., division of Stauffer Chemical Co. (Weston, Mich.).



Scene from "THE ANIMAL WORLD," a Windsor Production, presented by Warner Bros.

..."Junior" is made of daddy's bones

Old *Tyrannosaurus* was one of Nature's big jobs; his role after death was even bigger. From his remains, and those of other prehistoric life-forms, Nature created petroleum. Today, plastics made with petro-chemicals are used to make toy dinosaurs, building materials, high fashion fabrics, and countless other products.

Sinclair's petrochemical experience – raw materials – research – technical knowledge and well located facilities – are at your service. Whatever your chemical needs, whether it's established tonnage chemicals or new products just emerging from the test tube – call Sinclair *today!*

Anhydrous Ammonia • Ammonium Nitrate Solutions • Aqua Ammonia • Nitrogen Fertilizer Solutions • Aliphatic Solvents • Odorless Solvents • Aromatic Solvents • Heavy Aromatic Solvent • Toluene (Nitration Grade) • Xylene (Five Degree) • Para Xylene • Propylene Tetramer • Sulfur • Sulfonates (Oil Soluble) Corrosion Inhibitors • Lube Oil Additives

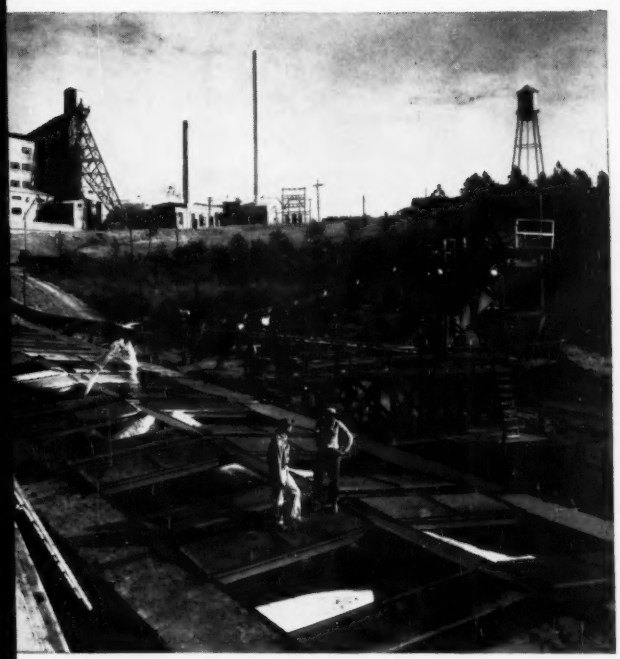
SINCLAIR CHEMICALS, INC.

Affiliate of Sinclair Refining Company

600 Fifth Avenue, New York, N. Y.
155 North Wacker Drive, Chicago, Ill.

Jefferson Island Rock Salt . . .

.. so pure that every chemical manufacturer benefits



The picture above shows rock salt being loaded into barges at Jefferson Island, La., for movement through the Inland Waterways. Many chlorine, synthetic rubber and other heavy industrial plants use barging to effect both economy and service.

For many years, rock salt from Jefferson Island has made possible many economies in chemical processing.

Mined in Louisiana from one of the world's purest deposits, this rock salt results in a consistently better end product—without the costly side reactions of impurities found in less pure salt. The big story is up to 99% purity at the source.

TWO GREAT NAMES MERGE AS ONE

Recently, the Jefferson Island Salt Co., merged with Diamond Crystal, a company known for more than 70 years as a quality producer of flake and granular salt. For example, Diamond Crystal is the leading supplier of salt to high quality food processors.

Jefferson Island Division, on the other hand, is the largest supplier of industrial rock salt by barge on the inland waterways. In fact, they pioneered the first complete ocean-going barge movement of salt to Gulf Coast chemical plants.

INHERENT PURITY—KEY TO COST SAVINGS

The inherent purity in Diamond Crystal Salt is a major factor in *all* industries.

In addition, maximum customer economies and service can result from using Diamond Crystal's complete facilities.

For immediate service and consultation on your salt problem, call the nearest Sales Office or write: Jefferson Island Salt Div., Diamond Crystal Salt Co., St. Clair, Michigan.

DIAMOND CRYSTAL SALT

SALES OFFICES: CHARLOTTE, ATLANTA, NEW ORLEANS, LOUISVILLE, BOSTON, NEW YORK, AKRON, DETROIT, CHICAGO, MINNEAPOLIS

PLANTS: AKRON, OHIO .. JEFFERSON ISLAND, LA... ST. CLAIR, MICH.

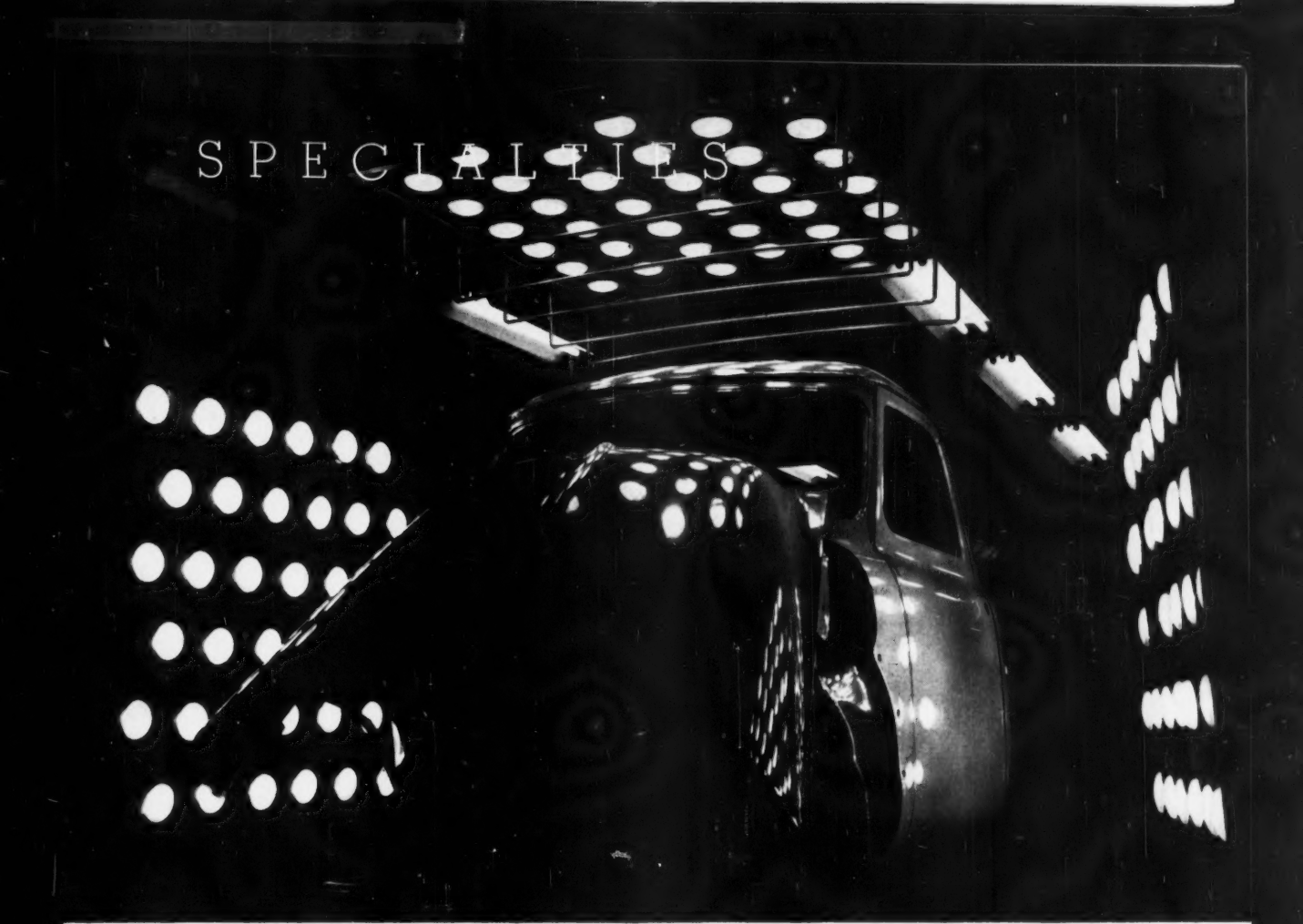
COLUMBIA-SOUTHERN ADDS ANOTHER NEW FACILITY TO SERVE YOU BARIUM CHEMICALS

Columbia-Southern announces the production of Barium Chemicals at South Charleston, West Virginia. This plant produces top quality barium chemicals, related chemicals and carbon bisulphide. The location of the plant, in the heart of the Ohio Valley chemical region, is well suited for prompt deliveries. Columbia-Southern looks forward to the opportunity of serving your barium chemical needs. Your inquiries are invited.

COLUMBIA-SOUTHERN CHEMICAL CORPORATION

Subsidiary of Pittsburgh Plate Glass Company • One Gateway Center • Pittsburgh 22, Pennsylvania

Anhydrous Ammonia, Barium Chemicals, Benzene Hexachloride, Calcium Chloride, Calcium Hypochlorite (Pittchlor®, Pittabs®), Carbon Tetrachloride, Caustic Potash, Caustic Soda, Chlorine, Chlorinated Benzenes, Chloro-IPC, Chrome Chemicals, Hydrogen Peroxide, Muriatic Acid, Pacific Crystals, Perchlorethylene, Rubber Pigments (Calcene®, Hi-Sil®, Silene®), Soda Ash, Sodium Bicarbonate, Sodium Sulfate, Titanium Tetrachloride, Trichlorethylene



Tough new automotive finishes spur paint-stripper makers to search for more potent products.

Brighter Finishes Spotlight New Strippers

Although auto makers' swing to epoxy undercoats and acrylic finishes for '59 models has given the public a better product, it has also created new problems for producers of paint strippers. Making a paint stripper* was once a matter of mixing alcohol, benzene and acetone. Today, however, it's not unusual for a paint stripper to contain as many as 10 different ingredients.

Although paint strippers for epoxies and acrylics have been developed, the problem of finding a fast, economical stripper for these finishes is far from solved. Whoever finds the answer will corner a neat market, garner a good share of total paint-stripper sales. Last year some $20-25 million were spent for industrial stripping compounds, about another $10-15 million for do-it-yourself home products.

*Products that take paint finishes off are generally called paint removers in the retail field, paint strippers in the industrial field.

Two-Way Break: In the industrial field, paint strippers are usually broken down into two main types—alkaline and solvent. Leading industrial alkaline stripper is caustic soda; in the solvent group, it's methylene chloride. Choice of stripper, and how it's used, depends on several factors: type of metal, method of surface preparation, type of primer, type of paint and number of coats, baking temperature and age of finish.

The methylene chloride type leads industrial strippers in dollar sales. One major producer estimates that 9 million gal. of this material (about 60% of total production) went into paint strippers, both industrial and retail, last year. Cost of methylene chloride strippers varies widely, from $1.80/-gal. to $5.35/gal., depending upon formulation and quantity purchased.

Strippers based on methylene chloride wrinkle paint films, rather than dissolve them, and are used at room temperature. It's claimed that they remove more types of paint finishes from a greater variety of metals than any other stripping agent.

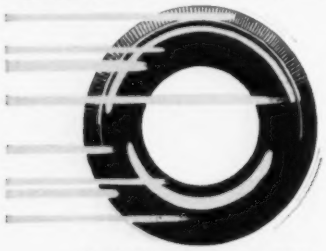
To keep up with paint changes, methylene strippers have undergone many formulation changes. A methylene chloride stripper may contain a cosolvent (usually methanol) to boost solvent action, an activator to enhance the penetration of the solvent into the finish, a wax to reduce volatility, a dispersing agent to blend the wax, and a surfactant to promote penetration and make the stripper rinsable. If the stripper is to be used on a vertical surface, a thickener is usually added, too. Thickening agents include methyl cellulose, ethyl cellulose, cellulose acetate and nitrocellulose.

The most research on methylene chloride products has been directed toward finding the best activator. Acid, amine or other alkaline ingredients are common activators. Others:

COLLOID CORNER

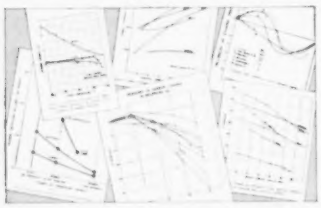
SEPTILLIONS IN THE HAND

...your hand can hold one septillion (a trillion trillions) Columbian colloidal carbon particles. A bead no larger than the period at the end of that sentence can contain 4,300,000,000,000 particles of uniform size and characteristics!



MILLION DOLLAR IDEAS

for the use of these minute particles include the strengthening of rubber. Some kind of phenomenon (not chemical reaction) causes reinforcement... adds great strength and wearability.



MULTIFOLD CHARACTERISTICS

result from sizes as small as 7 millimicrons. Take surface area, for example: One pound has the surface area of 30 acres. Or electrical conductivity: There are enough "electrical circuits" in a cubic inch of colloidal carbon to circle the world 10 times.

Columbian carbons—and iron oxides, too—of such small uniform size and pre-determined surface characteristics may have important uses in *your* industry. Write... tell us your area of interest.

COLUMBIAN CARBON COMPANY

380 Madison Ave., New York 17, N. Y.
DEPT. A

formic acid, acetic acid, monochloroacetic acid, ammonia, morpholine, mono-isopropanolamine, monoethylamine and mixed isopropanolamines. Primary disadvantage of the amines is that they react with chlorinated solvents and stain wood. On the other hand, acid or ammonia activators may react with metal (corrosion inhibitors are often added to help prevent this). A methylene chloride stripper containing an acid activator is said to be one of the more effective epoxy removers.

Biggest drawback of methylene-type strippers is high cost. And since they are almost always used at full strength, there's no dilution factor. They also evaporate rapidly. Most companies that use methylene strippers don't bother with reclamation, as the active components are usually lost into the air.

Flying High: By far the biggest outlet for methylene chloride strippers is the aircraft field. Big advantage over alkali strippers: they don't react with aluminum, the most common aircraft structural metal.

The aircraft field buys at least 3 million gal. of methylene chloride strippers annually. Of this, 60% is used on military planes, 40% on commercial planes. Most paint stripping is done on the outside surface of the plane; only 10% of all aircraft paint strippers are used on the interiors. An average of 25-30% of fuselage area is painted, 40-45% of the entire craft.

Bulk of strippers used on aircraft are for repainting and maintenance purposes. Stripper is usually sprayed on with an air gun or brushed on plane surfaces, then washed off with high-pressure water, after scraping.

Although the aircraft field is the biggest user of methylene chloride strippers (and its demands will rise), other outlets are becoming more important. Use of strippers on toys, lamps, gift items, etc.—where reject parts are a big factor—is growing. Methylene chloride strippers are also making inroads in the railroad, appliance, automotive and office equipment fields.

Quantity Leader: Even though methylene chloride leads the stripping field in dollar value, caustic soda is the quantity leader. Because many caustic producers don't keep close tabs on just how much of their product goes into stripping compounds, the size of this market is moot.

Low cost is the big advantage of caustic soda strippers. Average cost of a compounded caustic stripper (containing a surfactant for rinsability, other additives) is 20-45¢/lb. Cost may be as little as 6¢/lb. for straight caustic or as high as $3.50/gal. for a specially compounded stripper. Usual dilution ratio is 1 lb. of caustic stripper to 1 gal. of water.

Strippers based on alkalis dissolve the paint film, rather than wrinkle it, as methylene chloride types do. They are usually used as hot (180 F and up) solutions.

Stripper makers are developing more effective alkaline strippers. Much of this research was begun within the last year, and producers are reluctant to give details.

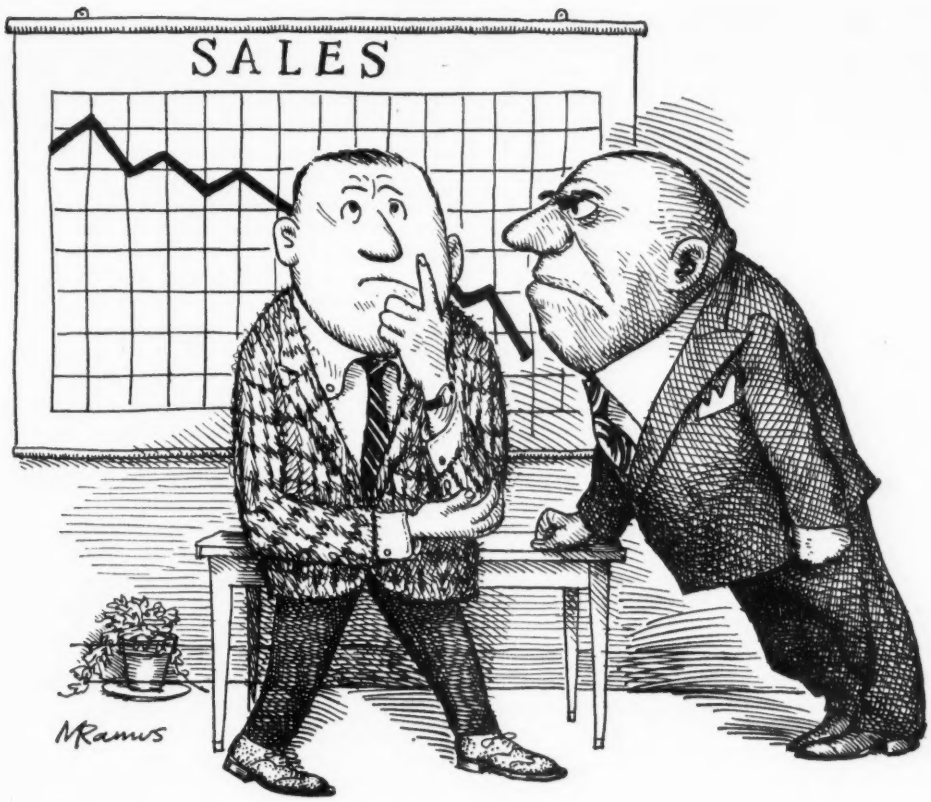
Some of the new alkaline strippers will contain a high-boiling solvent, e.g., glycol or Carbitol. Amine activators are reported to increase the effectiveness of alkaline strippers on alkyd and enamel finishes. Other alkali products containing new additives are said to be effective in removing epoxy and acrylic coatings. Stripper makers feel that there's a big potential market for upgraded alkaline products, while the market for straight caustic strippers will dwindle.

Alkali strippers are restricted to use on steel, copper and other metals that they do not attack. Aluminum or zinc is taboo.

The auto industry is probably the biggest customer for alkaline strippers. Dodge Division of Chrysler, for instance, buys 6,750 lbs. of alkali stripper every month directly from a Detroit formulator. Dodge buys in 450-lb. quantities, 15 drums a month. Figures for the entire auto industry are unavailable. Educated estimate: auto companies buy over 2 million lbs. of alkali strippers annually.

Many auto makers use straight caustic solutions, buy caustic directly from producers—to the dismay of specialty makers. One leading formulator says, "Auto makers think they're saving money when they buy caustic at 6¢/lb. What they don't realize is that they spend $20 an hour trying to rinse the stuff off. There's nothing harder to completely rinse off than straight caustic."

Specialty makers feel that compounded products are bound to grow,



The Perfect Solution

(nutritionally speaking)

"Cut out the brainstorming," roared the harassed sales manager to ivy league adman. "*Ruffage* breakfast cereal needs a *real* sales hypo."

Ivy league shrugged. "Okay, no dancing girls . . . *wait!* I've got a new wave length. Have you read about Pfizer *Lysine?* Terrific! It's something called an amino acid. Gives cereal products the high protein quality of meat or eggs. That kind of health bonus could really get *Ruffage* off the launching pad!"

The manager squints. "Boy, I think you may have it. Get Pfizer on the phone."

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

If you are considering amino acid or vitamin fortification of a food product (or, for that matter, if you need a food acidulant, antioxidant or preservative) get in touch with the Pfizer Chemical Sales Division. *For any problem which might be solved by a high quality organic chemical, think of Pfizer first.* Chas. Pfizer & Co., Inc., Chemical Sales Division, 630 Flushing Ave., Brooklyn 6, N. Y.

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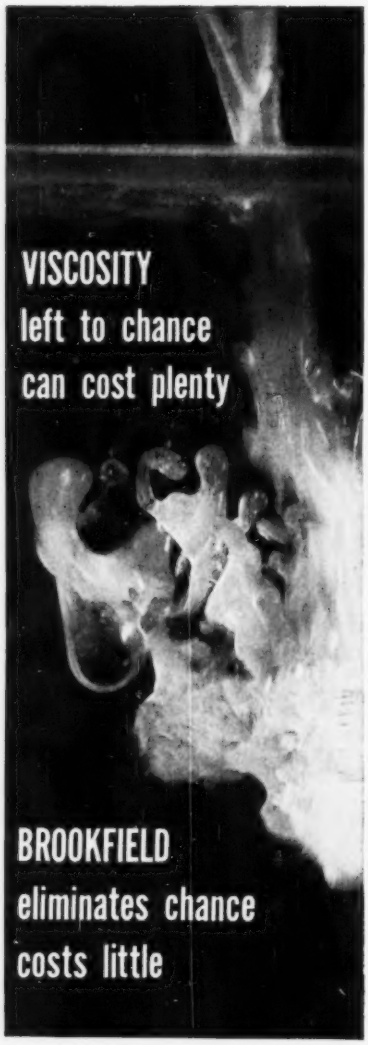

If you, like most chemical processors, are in the rough marketing position whereby you can't tolerate needless production waste . . . then give this some thought.

Have you considered the role of viscosity control in your processes? If not — you should! Viscosity is a product dimension that experience has shown should not be ignored . . . a product dimension Brookfield has proved need not be ignored. Both Brookfield laboratory Synchro-Lectric Viscometers and process-mounted Viscometrans involve small investments: yet they provide easy, accurate measurement, evaluation and control of viscosity in any fluid. Brookfield instrumentation is so simple that no special personnel training is required for operation.

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simply because straight caustic won't touch epoxies, acrylics, or melamines. Some auto makers already buy this type of product.

Few Rejects: The great bulk of paint stripper in the auto field is used to remove paint from conveyor hooks and trolleys. Very few reject parts are stripped. Most stripping is done on a continuous basis: a tank is installed in the conveyor line. On a noncontinuous basis, parts to be stripped are manually or mechanically placed in a stripping tank removed from the production line.

The continuous system calls for rapid stripping action—usually one to three minutes. No known stripper will strip epoxies or acrylics fast enough to allow continuous operation.

Strippers aren't used much in automotive refinishing. Stripper makers find that most auto refinishers prefer to rub or blast down the surface to be repainted.

Second largest user of alkaline strippers is the appliance industry. Here, stripping of reject parts, as well as conveying equipment (e.g., hooks), is important. Other outlets for caustic strippers are in these industries: railroads, commercial trucks, road signs, vending machines, juke boxes, paint vats and storage tanks.

Other Strippers: Although caustic soda and methylene chloride are the undisputed leaders in the industrial-stripper field, there are many contenders. Ethylene dichloride competes with methylene chloride. Among alkalis, potash and the silicates compete with caustic. Cresylic acid, chromic acid and concentrated sulfuric acid find some use as acid strippers, and phenol (used along with cresylic acid and a wetting agent) is also used, mainly by the auto and appliance field, as a stripping compound. Limited amounts of benzol-acetone strippers are used in the industrial field, but the chief users of these materials are the do-it-yourself and professional furniture refinishers and painters.

Retail Removers: At least 225 different brands of paint removers are available in the retail field. The two major types are methylene chloride (available both as a scrape-off remover and a wash-off remover that contains a surfactant for rinsability) and the benzol-acetone compounds formulated with a high wax content. Although accurate figures aren't available, it's pretty well agreed that the methylene chloride-based removers now outsell the benzol-acetone compounds, three to two.

The market for retail and professional paint removers breaks down something like this:

- Homeowners: They buy the methylene chloride type, mainly because it's nonflammable. Most popular retail sizes are pints and quarts at $1.30/pt. and up, $2.25/qt. and up. These products are carried by about 60,000 domestic dealers. Major outlets: paint stores, hardware stores, and lumber yards. Do-it-yourselfers buy about 85% of paint removers. And, according to one seller, 80% of these are bought by women.

Selling paint removers to homeowners is largely a seasonal business. Bulk of these materials are purchased during the spring and fall months. According to one large paint-remover manufacturer, "Most hardware and paint dealers hide paint removers in the back of the store during winter months to make way for the Christmas season. During summer months, the do-it-yourselfer is too busy taking care of his yard to worry about furniture reconditioning."

Most lucrative marketing areas for paint removers are middle-class residential communities. Sales fall off sharply in very high and very low income areas. Geographically, market areas break down in this order of importance: (1) Midwest, (2) West Coast, (3) New England, (4) Southeast.

- Professional: Professional painters and furniture refinishers tend to buy benzol-acetone types of removers. They're less expensive, their competence makes flammability less of a problem. They buy in 5-gal. cans or drums at $2/gal. and up.
- Furniture refinishers: Working with reject pieces (before they leave the factory) or on institutional equipment, they tend to buy the methylene chloride and benzol-acetone types about equally.

Who Makes Them: Many local companies make retail paint removers, but there are few national firms involved. Among the major companies: Klean Strip Co., Inc. (Memphis, Tenn.) with Klean Strip; Winfield-Brooks Co. (Woburn, Mass.) with TM-4; Savogran Co. (Boston, Mass.) with Strypeeze; Wilson-Imperial Co. (Newark, N.J.) with its Won-

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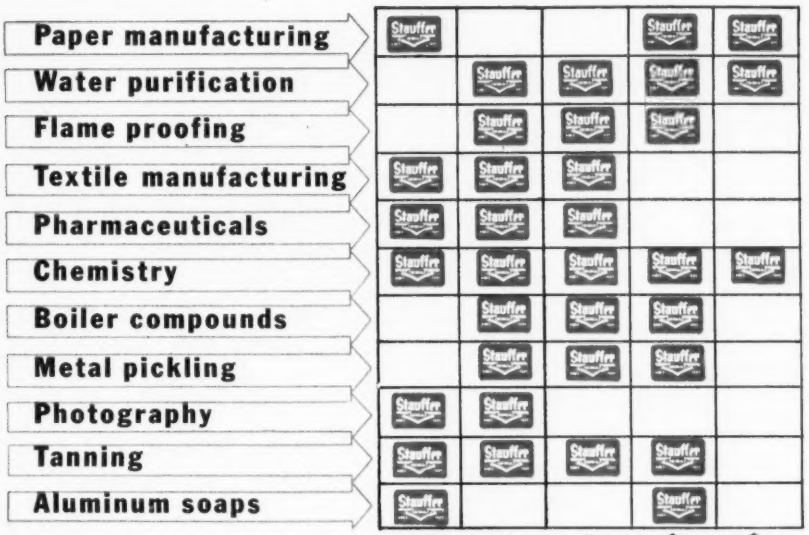

Major uses of Stauffer Alums, and the types of Alum commonly used for these purposes are shown at left. For these and an additional score or more of highly specialized uses, Stauffer supplies alums of highest purity, both solid and liquid; the solids in many grades, from powder to lumps of one to four inches in size.

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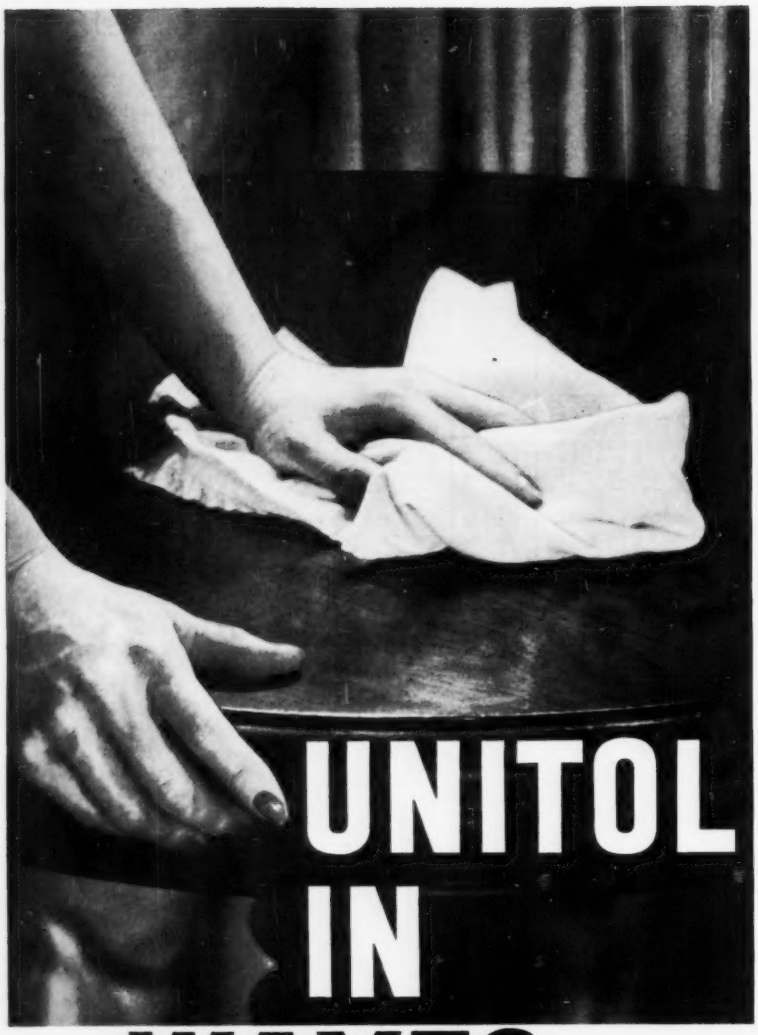

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der series; and Star Bronze Co. (Alliance, O.) with Zip Strip.

In addition to these specialty companies, such large paint companies as Du Pont, Glidden, Devoe & Raynolds, Sherwin-Williams, Pittsburgh Plate Glass and others also carry their own brands of paint remover. Private labeling, too, is common in the retail field. Practically all national chain stores—Kresge and Firestone, for example—and large mail-order houses like Sears, Roebuck and Co. and Montgomery Ward offer their own brands.

In the industrial field as in the retail field, there are hundreds of local companies. One reason for this: local companies can usually offer near-by customers a big price advantage. Shipping costs are lower, for one thing—a 55-gal. drum of methylene chloride weighs about 535 lbs.

Among the more important companies in the industrial stripping field: Oakite Products, Inc. (New York); Magnus Chemical Co., Inc. (Garwood, N.J.); Wyandotte Chemicals Corp. (Wyandotte, Mich.); Kelite Corp. (Berkeley Heights, N.J.); Turco Products, Inc. (Los Angeles); Enthone, Inc. (New Haven, Conn.); Pennsalt Chemicals Corp. (Philadelphia); The Diversey Corp. (Chicago); The Du Bois Co. Inc. (Cincinnati); Detrex Chemical Industries, Inc. (Detroit); Hooker Chemical Co. (Niagara Falls, N.Y.); Metal & Thermit Corp. (New York) and Whitfield Chemical Co. (Detroit). Among the suppliers of methylene chloride are Dow, Diamond Alkali, and Solvay Process Division of Allied Chemical.

Since selling stripping materials is largely service selling, most of these companies market their products directly. Most popular containers are 100-lb. and 55-gal. drums.

Headaches: Constant research in the paint field brings about rapid changes, making it tough for specialty makers to come up with products to remove the new formulations.

For each new finish, a remover must be found. If anything, paint products will become more specific—leading to a race between the paint manufacturers and makers of paint strippers. Those of the latter that don't keep pace in the development of new products may well find themselves losing out in the sales race as well.

Just out!

helpful chemical data for you

Here—conveniently cataloged—are selected organometallic, inorganic and organic chemicals that may lead you tc reduced costs and improved methods. Of hundreds produced those listed and described invite your consideration for use as gasoline or lubricant additives, catalysts, fungicides, bactericides and other biocides, chemical intermediates, plastic stabilizers, ceramic opacifiers, and other applications.

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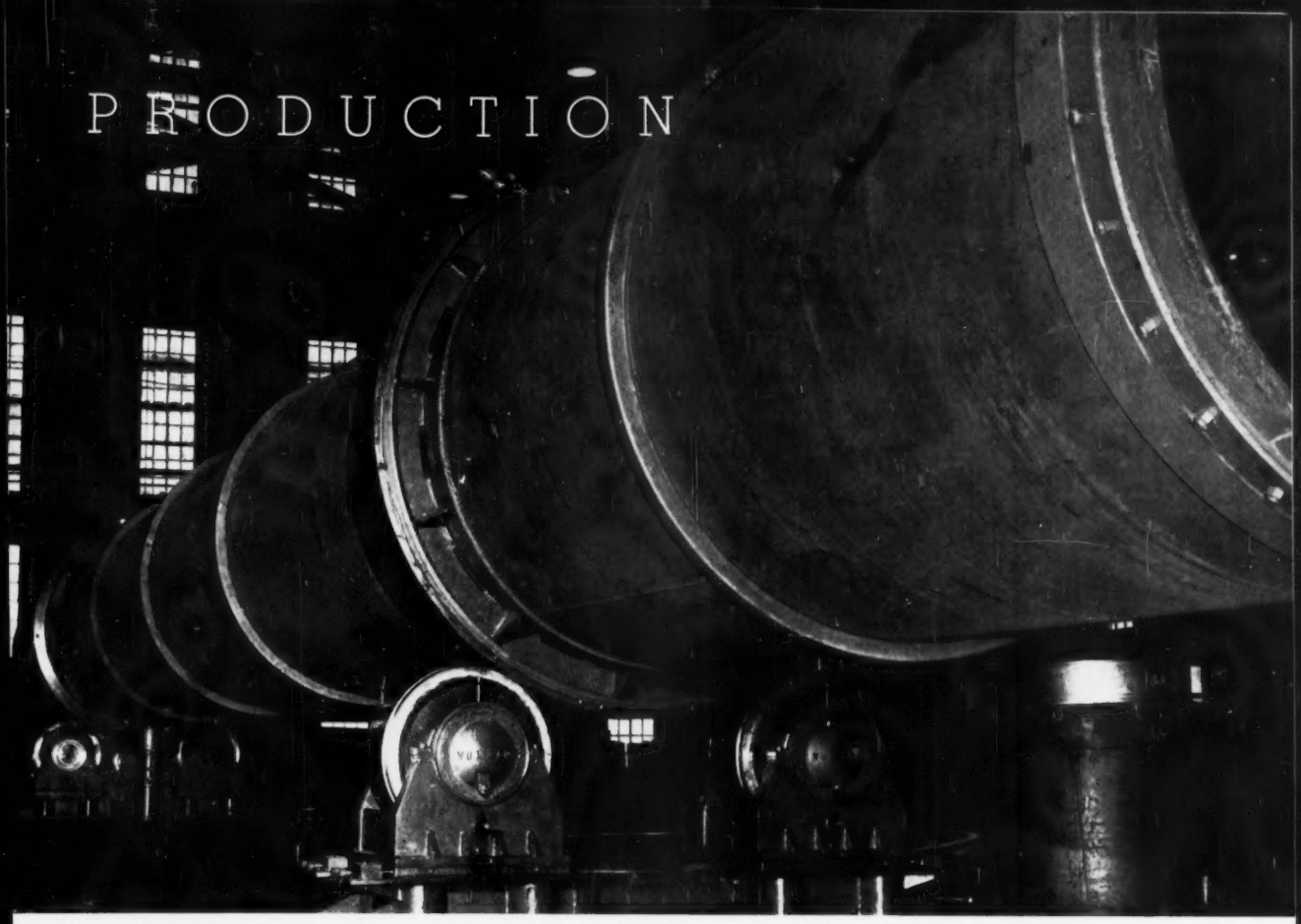


A hundred feet of rotary kiln rests on Vulcan Iron Works' new maintenance-cutting roller mounts.

New Mount Design Cuts Cost of Kiln Care

Ready for shipment this week to now-building plant of Pigmentos de Mexico S.A. in Tampico, Mexico, is a novel development in kiln design. The unit (above) is said to be one of the first to incorporate a number of features aimed at easing installation, cutting maintenance and downtime in any rotary kiln application.

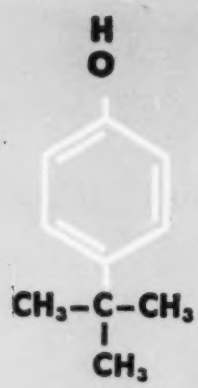
Main feature of the new kiln, developed by Vulcan Iron Works (Wilkes-Barre, Pa.), is a new mounting system. Vulcan claims the new feature makes it possible to assemble the kiln faster than conventional units, virtually eliminates bearing wear and subsequent shutdowns. Moreover, application of the kiln's new mount is not limited by sizes, type of service or rotational speed; this allows the kiln to sell at prices roughly equivalent to those of conventional kilns.

Novel Features: Vulcan modified the design for this kiln from a more radical, less successful one that it had introduced over a year ago. Key points in the new design (*right*) are the use of spherical roller bearings rather than conventional bronze bearings, and the introduction of a swivel action to the rollers that support the kiln, thus making them self-aligning.

Here's a rundown on these and the other novel features claimed for the new kiln:

- Spherical roller bearings boost average bearing life to 500,000 hours, far beyond the limit of conventional bronze bearings.
- Self-aligning trunnion rollers, on which the kiln rides, eliminate constant adjustment and uneven wear by swiveling on a vertical pin that joins a well-greased brass plate-cast iron block interface in the mounting.
- Joints are doweled for fast, accurate welding in the field.
- A thrust roller, used with the self-aligning trunnion rollers, eliminates thrust (axial) load on the roller bearings.
- A continuous forced-feed lubri-

Kiln mounting has: (1) spherical roller bearings; (2) greased interface that permits the mount to swivel.



Now in commercial production at Stepan's new Millsdale, Illinois plant (near Joliet) is p-tert-Butylphenol. This new Stepan product . . . one of a series of Stepan substituted phenols . . . can be supplied flaked or as a concentrated solution in caustic. Bulk shipments of the molten Butylphenol can also be made where required. There are a number of interesting commercial and potential uses for p-tert-Butylphenol, and we would be pleased to send you working samples for your evaluation.

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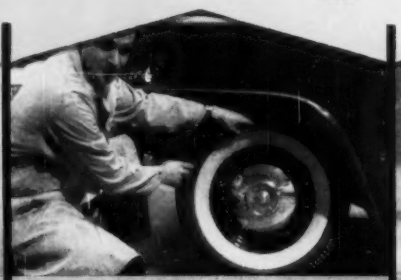

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cation system circulates cool, clean oil for the bearing assembly.

- The mounting is held in a weldment rather than in a heavy casting.
- Alloy steel is used in the rollers and the tire that encircles the kiln and contacts the rollers.

Cost Comparison: Vulcan figures that at its present selling price a new kiln costs about 3-5% more than a conventional one. However, with continuing improvements in manufacture, the price should be about the same as that of a conventional unit within a year and even lower in two years. Vulcan says it is delivering this first new kiln at the price quoted for a conventional kiln: $67,000 ($85,000, including the accompanying combustion chamber and cooler). Reason: after Pigmentos de Mexico had ordered a conventional kiln for pigment calcining, Vulcan figured it would be worthwhile to provide the new design at no extra cost in return for the chance to test it in the field.

Savings Come with Use: But the big savings come in installation and production. Since Vulcan lacks actual field data, it understandably declines to estimate these savings in terms of dollars. But some of its observations give an inkling. For instance, initial assembly is simplified by doweled parts that are machined to fit accurately, are preassembled in the shop as a check. Painstaking adjustment of the trunnion rollers, on which the kiln rotates, is eliminated by the self-aligning feature and by a special thrust roller.

Consequently, the new kiln will start operating—and paying off—in well under three months, according to Vulcan, far less time than is needed to place and put into operation conventional kilns. The kiln pictured (*p. 57*) was erected in the shop (prewelded) by two men with a crane in just two days. The major job still to be done after the kiln is delivered will be addition of a refractory brick lining.

The three features most responsible for lowering costs of operation and maintenance are the self-aligning rollers, the spherical roller bearings and a forced-feed continuous lubrication system. Self-alignment eliminates the necessity for constantly readjusting the angle of the rollers to compensate for slight shifts in the kiln's axis. Uneven wear on roller or bearings doesn't enter in because all the load on them is radial (the thrust component being handled by the thrust roller) and evenly distributed. The radial load also allows standard formulas to be used in calculating bearing life. In this case, the calculated figures are 100,000 hours of minimum life and 500,000 hours of average life. Such long lifetimes should eliminate need for frequent shutdowns to replace worn bearings.

The automatic lubrication system also helps extend bearing life and contributes to the lowering of the coefficient of friction from 1.8% to 0.18%—a saving of 90% of the frictional horsepower load. The kiln pictured weighs 40 tons when empty, is rotated by a 10-hp. motor drawing 7 amps. of current.

Another way in which Vulcan upgraded its product without increasing manufacturing costs was by devising a relatively low-cost weldment to replace the conventional bulky casting used as casement for the roller and bearing mechanism. The money saved in this way is used to provide special alloy steel for the rollers and tire. Hardness of the steel for the rollers is Brinnell 245 and the tire, 210, compared with a maximum hardness of 160-180 for conventional commercial-grade castings.

Vulcan, which has a patent application pending on the new self-aligning roller and antifriction bearing design, expects its design to cause a stir in the traditionally conservative kiln-using industries. What it needs now is field-test evidence that its claims are as good in production as they are on paper.

EQUIPMENT

Centrifuge: The Sharples Corp. (2300 Westmoreland St., Philadelphia 40) has just shipped the first of its C-41 Super-D-Hydrators. These are newly designed, high-capacity crystal-drying centrifuges. The C-41's bowl is about 50% larger in diameter than previous models; now, up to 150 hp. may be applied, twice the maximum power taken by older models. The new unit, following today's trend, is designed for operation at pressures up to 15 psi. Higher pressures (to 150 psi.) are possible with special modifications.

A newly designed knife for removing cake permits discharge of 300 lbs. of salt in 1 second.

The first units will be installed in low-temperature hydrocarbon and polyolefin processes. Sharples lists capacities ranging from 20-24 tons/hour for ammonium sulfate to 1.0-2.5 tons/hour for polypropylene slurries. Cost: $45,000 to $70,000 for regular models, depending on materials.

•

Sulfite Determination: Betz Laboratories, Inc. (Gillingham & Worth Streets, Philadelphia 24) has developed a new method for sulfite determination in boiler water. It suggests using its new dry indicator instead of 50% sulfuric acid and starch solution.

•

Stainless Steel: Armco Steel Corp. (Middletown, O.) has developed a new corrosion- and heat-resistant stainless steel it is calling Armco 22-4-9. Armco says the new steel is a strong, hard, erosion-, oxidation- and corrosion-resistant material for service at temperatures of 900 to 1600 F; it says the alloy was developed for power and chemical equipment, suggests applications such as steam valves and gas turbines.

•

Air-Conditioning Calculator: For engineers who determine air-conditioning loads, Libbey-Owens-Ford Glass Co. (608 Madison Ave., Toledo 3, O.) offers a new heat-gain calculator. The calculator simplifies figuring of heat gain in Btu. per hour per square feet of window area due to directly transmitted sun and sky radiation and energy from radiation after absorption in glass.

•

Pipe-Heating Unit: General Electric Co. (Schenectady 5, N. Y.) is out with a new prefabricated pipe-heating unit for overcoming heat-transfer losses in liquids. The unit, for pipes up to 3½-in. outside diameter, is a steel-sheathed tubular heater mounted on a 3-ft.-long aluminized reflector. Mating halves of the unit clamp over pipe, adjusted to fit pipe diameter with set screws. Bimetallic thermostat has a range of 0 to 650 F. Heater is rated at 600 watts, 120 or 240 volts, is particularly adapted to restoring heat to molten lead, asphalt and sodium.

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Motor-Control Enclosures: Allis-Chalmers Manufacturing Co. (Milwaukee 1) is offering new Shelter-Clad

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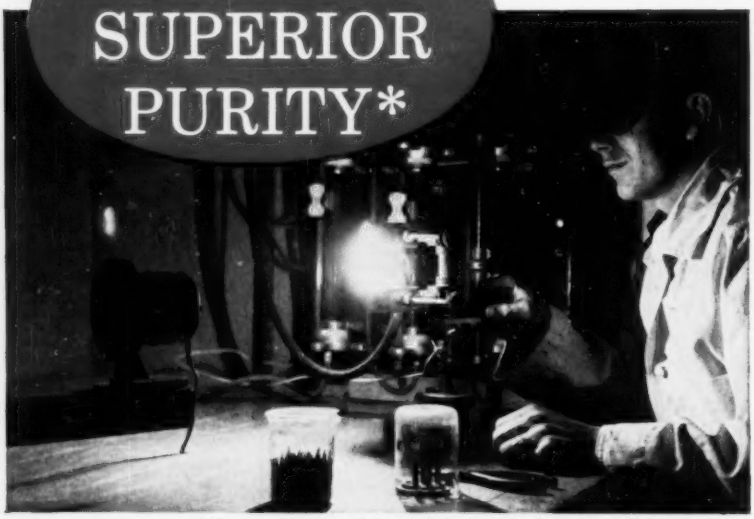

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walk-in enclosures for outdoor protection of Type H, 2,000- to 5,000-volt motor controls and maintenance personnel. Enclosure is formed by two facing rows of control cabinets bridged by a metal roof, has doors at each end. Aisle is 5-ft wide. Backs of cabinets form outside walls. Any number of pairs of cabinets can make up the basic unit, be added or removed.

•

Gearmotors: Two new large-size gearmotors, the largest standard units to be produced by Philadelphia Gear Works (3620 G St., Philadelphia 34), are rated at up to 200 hp., have 94 to 97% efficiency depending on the number of reductions incorporated. Double, triple and quadruple reductions in ratios to 440:1 are offered.

Another new gearmotor offering is The Lima Electric Motor Co.'s (Lima, O.) line for vertical mounting. Units with 1- to 75-hp. ratings with 350- to 7½-rpm. reductions are available.

•

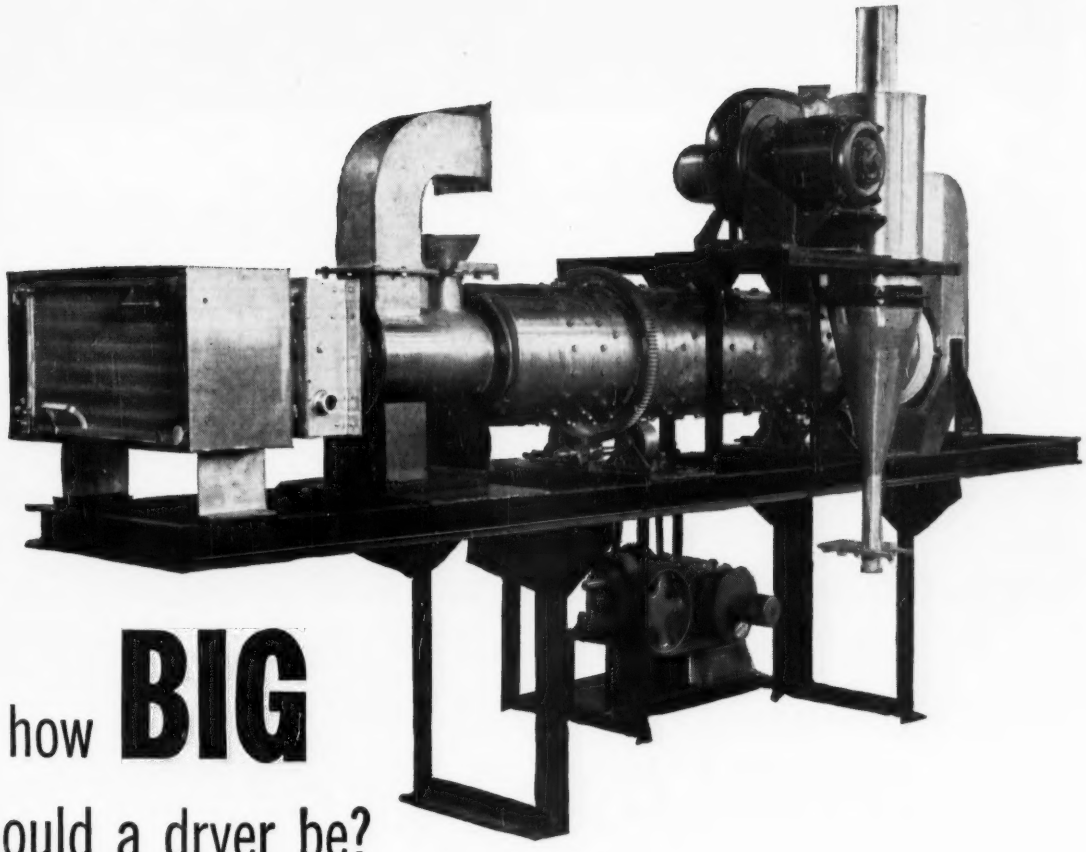
Boron-Hydrides Detector: A colorimetric spot test is the measuring method used by Mine Safety Appliances Co.'s (201 N. Braddock Ave., Pittsburgh 8) new instrument for detecting toxic concentrations of boron hydrides in air. Detector has a positive-displacement hand pump with sampling head for holding filter paper, polyethylene syrette containing solution and dry reagents, a color comparison card and calibration chart. Measurement limits: 0.01 at 1 ppm. for pentaborane and decaborane, 0.1 to 3 ppm. for diborane.

•

Pumps: The Rochester Div. of Consolidated Electrodynamics Corp. (1775 Mt. Read Blvd., Rochester 3, N. Y.) and The Union Steam Pump Co. (Battle Creek, Mich.) are offering new pumps:

Rochester offers the MCF 40,000 oil-diffusion pump and the MHG 30,000 mercury-diffusion pump, both designed for moving large gas loads at very low pressure. The MCF pump is suggested for high-vacuum melting operations, has a capacity of 13,000 micron liters/second at 4×10^{-4} mm. Hg. using a forepump. Ultimate vacuum of MHG pump depends on type of baffling used.

Union's new pump, Series TX-10, is an all-purpose triplex pump with a 10-hp. continuous input rating, 12½-hp. rating for 10 hour/day.



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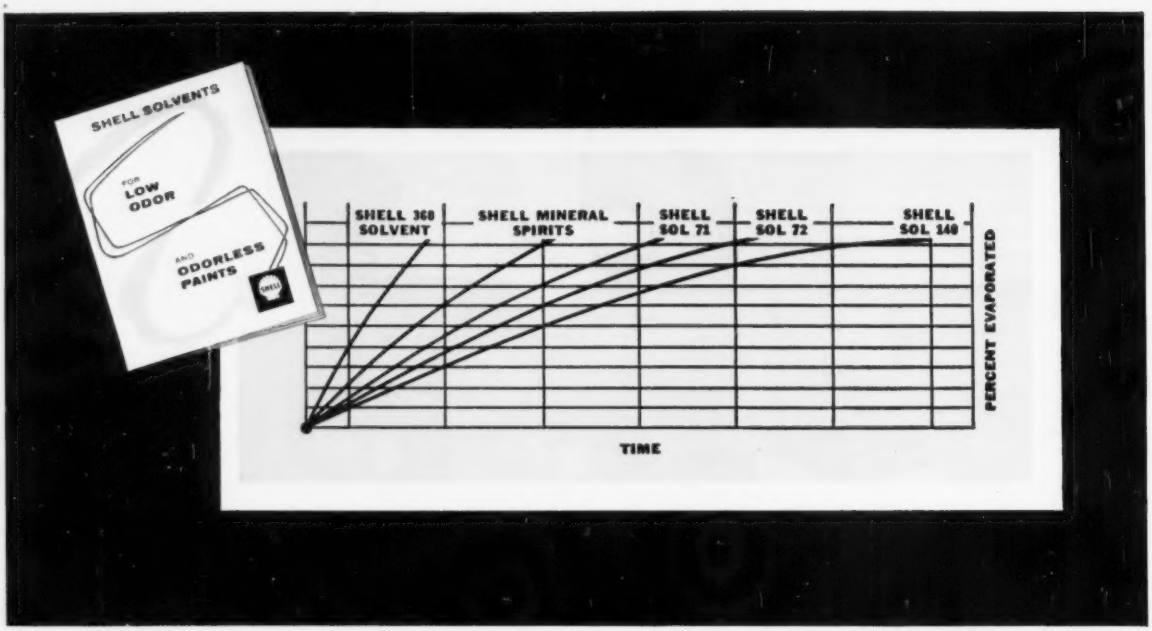

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SHELL

Technology
Newsletter

CHEMICAL WEEK
January 24, 1959

Control of rocket thrust has been achieved by the Navy. At the Bureau of Ordnance test station (China Lake, Calif.), Navy researchers have put together a prototype control system for rocket engines that permits the thrust to be reduced or turned off, at will. It employs prepackaged fuels—liquid fuels in aluminum containers. The fuels are hypergolic (ignite spontaneously), so there's no need for an ignition system. And they're pressured—rather than pumped—into the chamber. The system has been ground-tested on a 10,000-lb. thrust engine. The Navy hopes to build a flight version, believes it will be capable of controlling thrusts up to 1 million lbs.

The development is similar to Reaction Motors' Guardian packaged-fuel engine (*CW Business Newsletter, Aug. 30, '57*). Apparently, the Navy has added throttling and shutoff. (The Guardian is traced to a Navy development, presumably the same one that fathered the latest Navy achievement.) Reaction Motors is making one size of Guardian in a production model, has another in development. It has built a 50,000-lb. thrust engine. Mixed amines serve as the fuel, inhibited nitric acid as the oxidizer.

•

Key to AEC's 5-lb. atomic power plant—the SNAP III—is a new, highly efficient thermoelectric material made by doping semiconductors of lead telluride with controlled trace quantities of impurities such as bismuth and manganese. In SNAP III, 20 pairs of lead telluride thermocouples—arranged like spokes around a core of radioactive material—capture the heat generated by radioactive decay and convert it into electric energy at an efficiency of 8-10%.

The fuel is 3,000 curies of polonium-210—a man-made isotope produced at an experimental cost of $30 million ($10,000/curie). It's estimated that this cost can be reduced drastically by utilizing polonium-210 or other suitable isotopes recovered from waste fission products. And with mass production methods, manufacturing costs of the 5-lb. units (exclusive of fuel) may be cut to as little as $200.

Power output of the unit—5 watts during the first 140 days (the half-life of polonium-210), dropping to 3 watts during the second half-life period—is too low for most industrial applications. But it's expected to be extremely useful in satellites that would require 1,450 lbs. of the most efficient conventional batteries to provide the same total power.

•

Expansion of fluid coking facilities at General Petroleum's Torrance, Calif., refinery will boost yield of gas oil and gasoline from heavy crudes, at the same time will serve as a smog weapon. Expansion

plans followed close on the heels of a new Los Angeles pollution ruling that bans the burning of fuel oil containing more than 0.5% sulfur during the smog season from May 1 to Oct. 31.

•

Lubes for the ultrahot-running jet engines of the future (*CW, Dec. 20, '58, p. 35*) may include esters of fluoroalcohols and di- or polybasic acids, according to Du Pont researchers E. C. Ballard and E. E. Sommers. A fluoroalkyl camphorate and a fluoroalkyl pyromellitate are the most promising esters tried so far. The camphorate staves off oxidation at bulk oil temperatures up to 400 F and the pyromellitate up to 500 F; and the camphorate performed well in a 100-hour jet engine test at a bulk oil temperature of 300 F. Neither lube, however, yet meets the viscosity and low-temperature properties stipulated in tentative Military Specification MIL-L-9236. More research, Ballard and Sommers believe, should lick this problem.

•

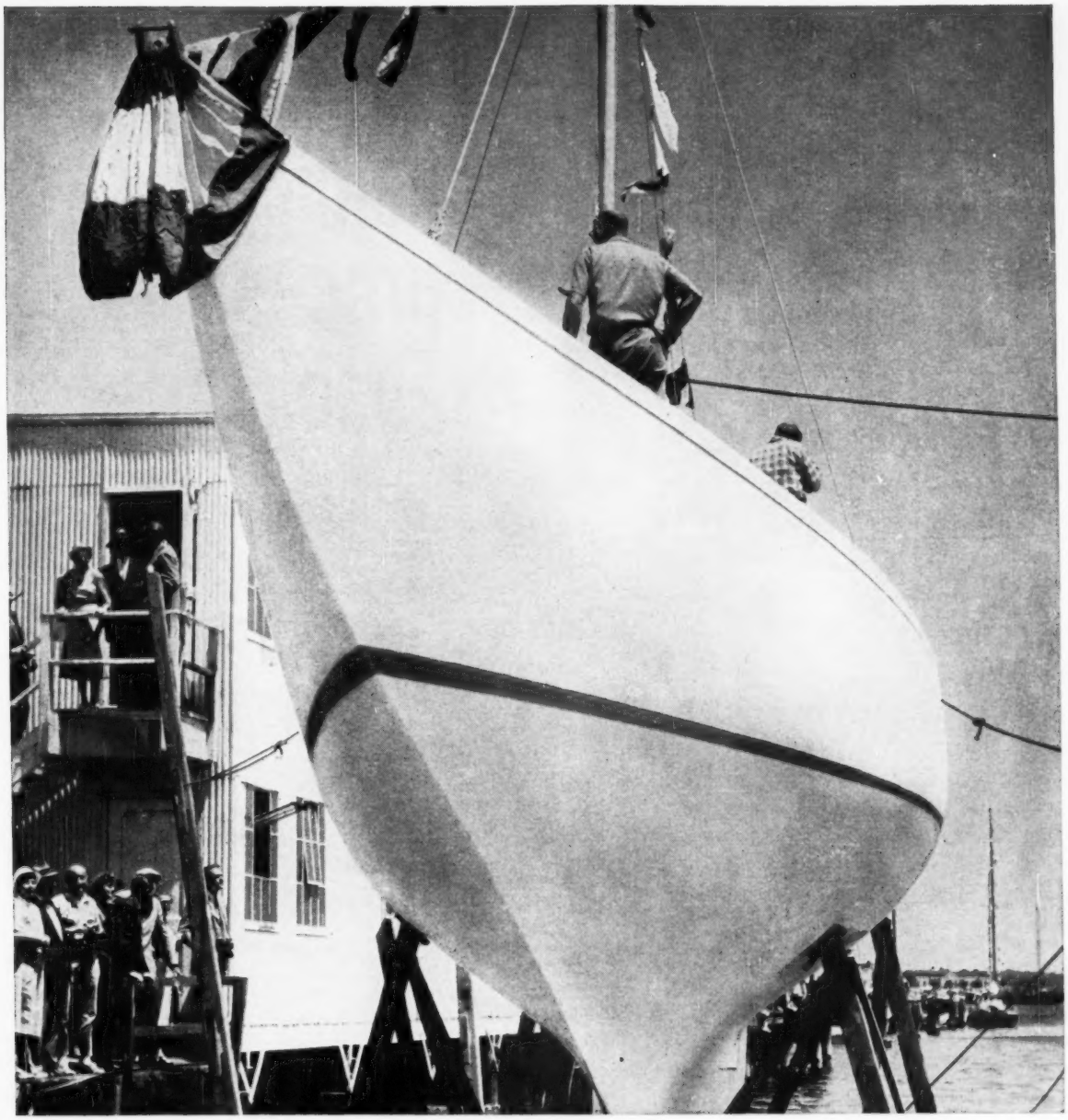
A new auto muffler with a vanadium pentoxide catalytic converter that eliminates 60-73% of unburned hydrocarbons (believed to contribute to smog formation) was unveiled at last week's Society of Automotive Engineers meeting in Detroit. It was developed by Ford Motor Co. staffers. Catalyst life is currently estimated at about 10-20,000 miles, or about one year of average driving. Installed cost might be around $150, Ford believes, with the price dropping somewhat in mass production. Ford does not manufacture mufflers; it conducted its research as part of a cooperative study undertaken by the vehicle combustion products committee of the Automobile Manufacturers Assn.

•

A new drug called Modutrol has reportedly cured 31 of 35 cases of peptic ulcers. The clinical trials were made by Dr. Louis Rosenblum, of the New York College of Medicine. Modutrol contains a nerve-blocking agent, antacids, and a new tranquilizer (Sycotrol, chemically 1-piperidineethanol benzilate hydrochloride). Ulcer drug and tranquilizer were both developed by Reed & Carnrick (Jersey City, N.J.), a subsidiary of Block Drug Co. (Jersey City, N.J.). According to Rosenblum, the healing occurred without requiring patients to adhere to a strict diet.

•

What's ahead for steroid hormones? New tailor-made versions may help control heart disease, cancer and many diseases of old age, according to Francis Brown, president of Schering Corp. (Bloomfield, N.J.). Brown told a meeting of investment analysts in Chicago last week that over 30% of Schering's $7.5-million 1959 research budget has been earmarked for hunting active new steroids. He hinted at the possibility of a pending breakthrough in steroid research —"something so new and radical that it is beyond guessing or prediction."



TITANOX*-eye view of the Columbia

Surprise! We're not going to claim that Columbia won her stunning victories last summer because of the TITANOX titanium dioxide in her paint. Chances are this superb craft so skillfully skippered would have glided home the winner even without the leader of white pigments.

TITANOX-RA-NC was chosen as the white pigment for the paint that went on the Columbia, just as it is the chalk-resistant white pigment for all coatings that take to the water and the weather.

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Paint for the Columbia was formulated and manufactured by Tarr and Wonson Ltd., Gloucester, Mass.

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A catalytic process that provides the base material used in producing formaldehyde, anti-freeze and other products.

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A catalytic process for removing residual acetylene from ethylene through selective hydrogenation. Used in the production of polyethylene grade ethylene.

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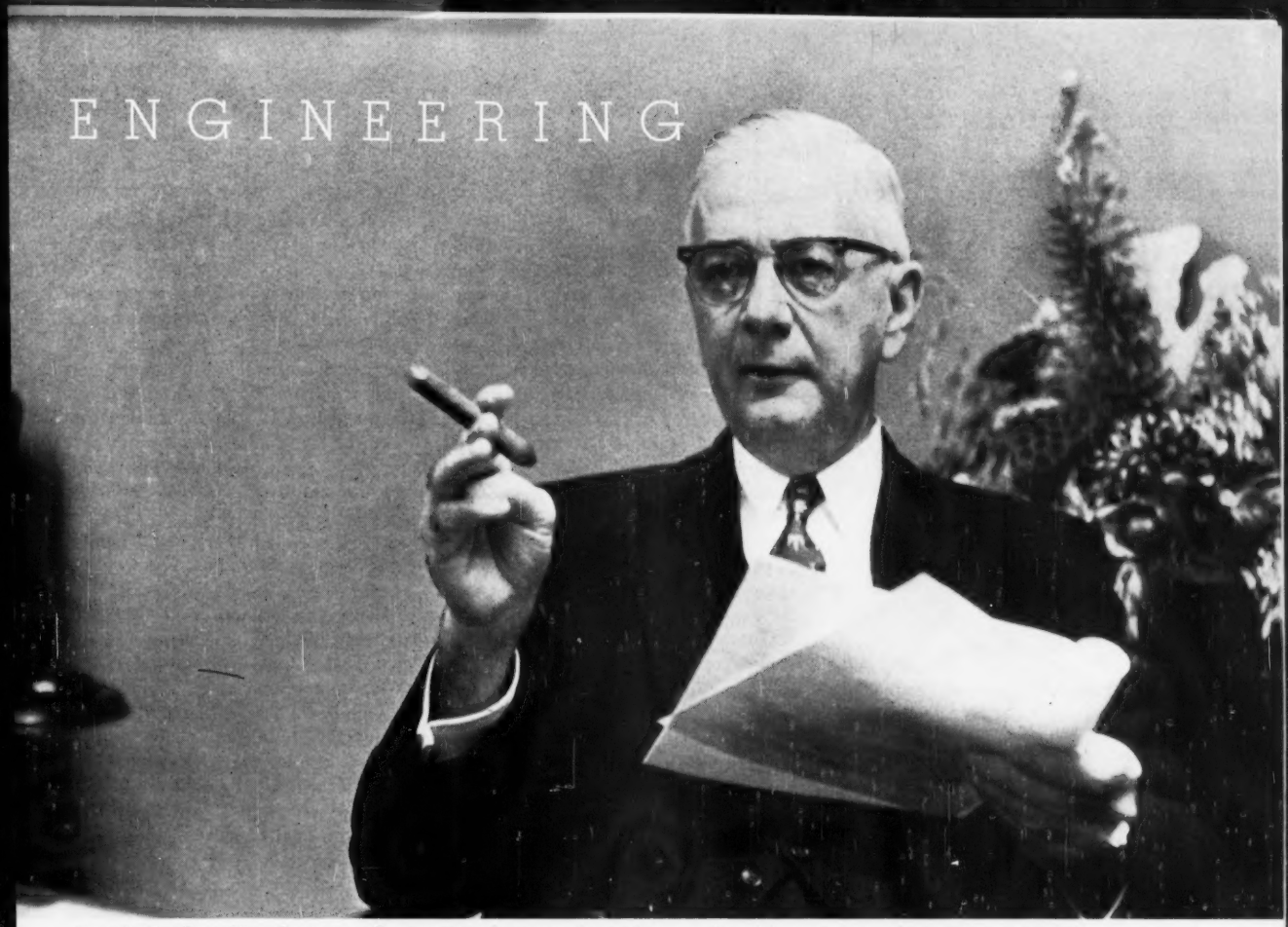


Esso's Paules: 'For best results, researchers and engineers should report to the same person.'

Proposing Research-Engineering Wedding

In the cavernous grand ballroom of New York's Roosevelt Hotel, several hundred technical executives convened last week for an American Management Assn. special conference on "Gearing Research to Profit Goals." A highlight of the session was a bold stand on a much-debated problem by panelist Charles Paules, vice-president of Esso Research and Engineering. Paules' dictum: combine engineering with research under one chief.

He cited these steps to implement this organization:

(1) Make periodic reviews of long- and short-range programs to catch any opportunity for improvement and to spot changing conditions.

(2) Take advantage of new methods (computers, systems engineering, operations research, etc.) as they come along.

(3) Provide varied training programs tailored to boost the capability of each engineer.

(4) Reward technical skills on the same scale with comparable administrative skills.

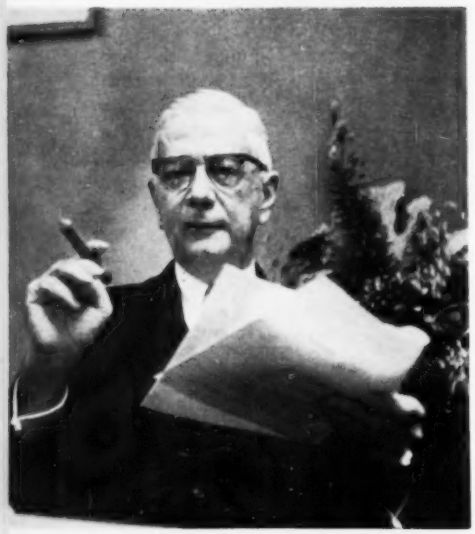
Esso is qualified to talk on this subject, having dealt with combined research and engineering for nearly 30 years—since Standard Oil Co. of New Jersey transferred its operations to subsidiaries, including the then newly formed Standard Oil Development Co. (now Esso Research and Engineering Co.). Although there were doubts at the start, the company is now firmly convinced of the wisdom of combining the two functions.

One of the most recent endorsements of the idea was given by Sun Oil Co. (Philadelphia), which joined its engineering and research divisions several months ago. At the same time, Sun made a dramatic organizational change intended to keep the company on constant alert to new cost-cutting methods.

From the old Engineering Division, Manufacturing Vice-President C. H. Thayer picked out a trouble-shooting group that had a ready knowledge of modern electronic and mathematical techniques. This group was set up as the Advanced Management and Methods Division—on the same level as Sun's top refinery management and its Research and Engineering Division.

Why Combine? The question of why engineering and research should report to the same man is answered in the word "coordination." The very factor that usually separates the two into distinct divisions—difference in approach—is one of the strongest reasons for combining them.

The research approach is traditionally one of systematic trial. Engineering, on the other hand, is interested in designing operating equipment aimed at economical production. Without the up-to-date research data, engineering could conceivably get off the basic track and design a fundamental flaw into its equipment. And research carried on in complete isolation from



'First and foremost, the company's engineering department cannot be static.'

engineering may tend to be nonproductive or oriented along impractical lines.

Having representatives of the engineering function in on a project from inception in research is the best way to ensure a well-balanced program; and having both report to the same management individual is the best way to get smooth coordination, according to Paules.

Does it really work? It does, if lowering plant construction costs in the face of inflation is the criterion. As Paules says, "In our own case, improved processes and better designs have cut the cost of new refinery equipment to such an extent that, on an actual dollar basis, the cost of new equipment to do a given job has decreased over the years."

Keep Flexible: In matching the organization with the job it must perform, Paules stresses the importance of flexibility. He advocates periodic reappraisals of both long- and short-range programs as a vital means to achieve flexibility. He points out that a given organization or program is formed originally to meet certain needs with specific available personnel (especially key management figures). As the circumstances change, the organization or program should change to meet them.

The purpose of long-range planning is to set the goals of the organization; that of short-range planning to make sure operating methods are the best. Thayer says, "We look forward to constant change—in plants, organization, personnel assignment and working conditions as we seek to solve the problems imposed by new conditions."

Paules emphasizes, however, that flexibility should not be an excuse for running a "sloppy" organization. The idea is to discourage a stand-pat attitude, encourage suggestions for constructive change.

Bridge the Gap: Two ways to bridge the gap between the actual organization and the ideal: awareness of new techniques and adoption of adequate training. As its major responsibility, Sun's new division keeps abreast of new trends in automation, applies them in manufacturing operations wherever they will give practical economic gain outweighing their cost.

And Esso, in a report made by representatives of lower management levels, found that their executives-of-tomorrow foresee a greatly enlarged place for today's new techniques.

Paules also stresses the importance of adequate training for engineers, in line with developing personnel to fit the needs outlined in the long-range program. Included in such a plan are all the conventional training methods —on-the-job guidance, special training programs, a reasonable amount of job rotation, formal courses—but most important is that they be properly used. The aim is to specially tailor each engineer's training to his personal needs.

Rewarding Talent: Esso Research and Engineering's experience also includes the idea—still more talked about than practiced in industry—of providing a separate "ladder" of advancement for talented technical men of little administrative ability or interest. Although the program has been in full operation only two or three years, the company finds it the best way to recognize the technical ability upon which the success of the whole organization ultimately depends. And equality of technical and administrative functions isn't limited to salary scales. "If an administrative position rates a rug on the floor or reserved parking place, so does the equivalent technical position," says Paules.

Paules' message in short: streamline engineering for higher profits.

More Building in '59

Although new plant construction still shows the effect of last year's recession-inspired cutbacks, all indications point to an upward trend in engineering and construction business in 1959. That's the consensus of representatives of the 26 member companies attending last week's annual meeting of National Constructors Assn. at New York's Roosevelt Hotel.

NCA President Carl Whyte, of Procon, Inc. (Des Plaines, Ill.), reported "a pickup in sales activity in both the talking and the contract-signing stages during the past several months." Engineering - construction companies are currently quoting on more jobs than they were at this time last year; prospective work is above normal for a first quarter.

As a result, engineering activity

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Lixator has no moving parts—nothing to get out of order.

Downflow principle. After water is admitted into the Lixator, it flows *down* through the rock salt in the dissolving zone.

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Fully automatic. Whenever brine is drawn off, water is automatically admitted into the dissolving chamber to make more brine. Rock salt flows in from a Lixator hopper or down a chute from an overhead bin. The only requirement is to keep the storage section filled with Sterling Rock Salt.

Great flexibility. The Lixator can be placed anywhere in the plant, at a point most convenient for salt delivery. *Pipes* deliver brine to points of use.

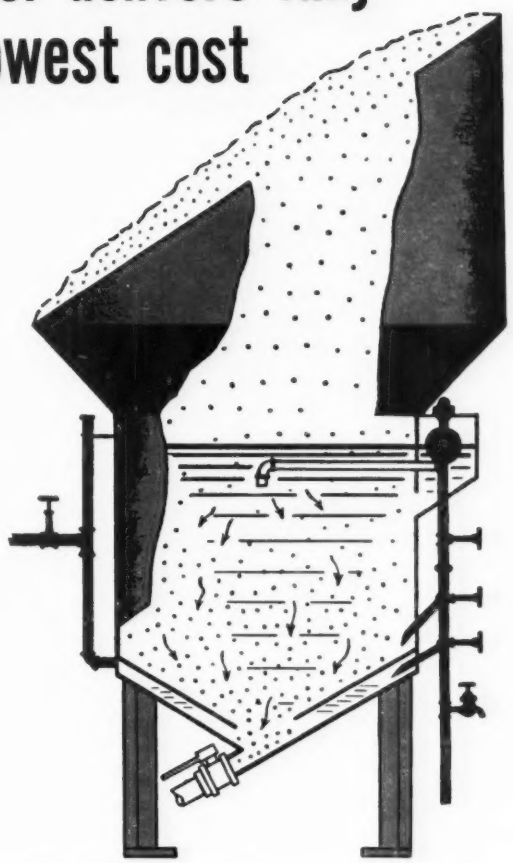
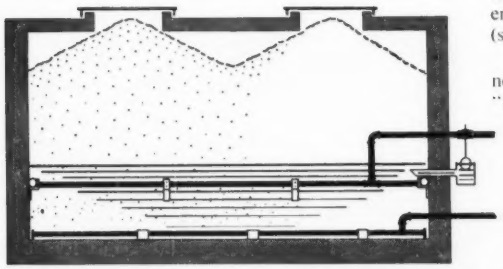


Diagram of Sterling Model Lixator. This is today's most widely used rock salt dissolver. It's available in many standard sizes—from 24″ to 120″ in diameter . . . with brine-making capacities up to 6,000 gallons per hour. Lixators come in enameled steel, Monel metal, or corrosion-proof plastic . . . with storage hoppers (standard low-lip, wall-type, cylindrical, corner, etc.) to suit any plant requirement.

For information on how your plant can save money with a Lixator, contact the nearest International Salt Company sales office. You can also get a free copy of "Brine for Today's Industry"—which fully describes the Lixate Process.



▲ **Diagram of Sterling Storage Lixator.** Designed for larger operations, the Storage Lixator is a combination salt storage, salt dissolving, and brine storage tank. On delivery, Sterling Rock Salt is unloaded directly into the Lixator. Lixate Brine is made automatically, as it is in every type of Lixator.

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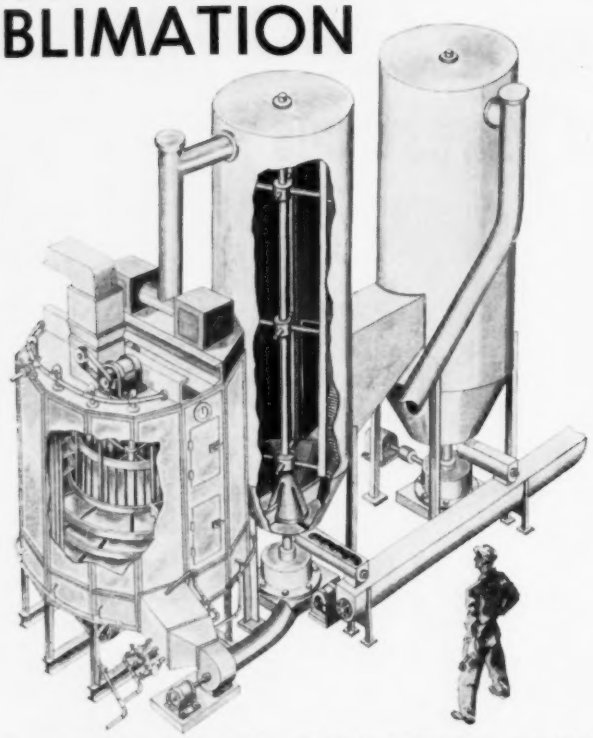

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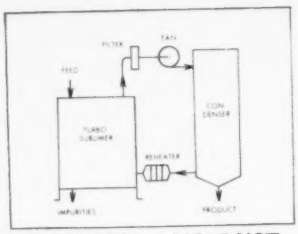

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REPRESENTATIVES IN PRINCIPAL CITIES

will accelerate during the early part of the year, predicted Whyte. But the pickup will take longer to make itself felt in actual construction work, which normally lags engineering by 12-15 months. Foreign projects enabled many firms to maintain a high level of activity last year, are expected to swell future demands for U. S. engineering-construction services.

Modernization Leads: Most of the anticipated increase in the chemical process industries' engineering activity is expected to come from modernization programs (*CW, Oct. 11, '58, p. 55*). Many companies now operating at less than full capacity are dusting off modernization plans they temporarily shelved during '58. Their goals: higher processing efficiencies, product diversification, and an upgrading of product quality.

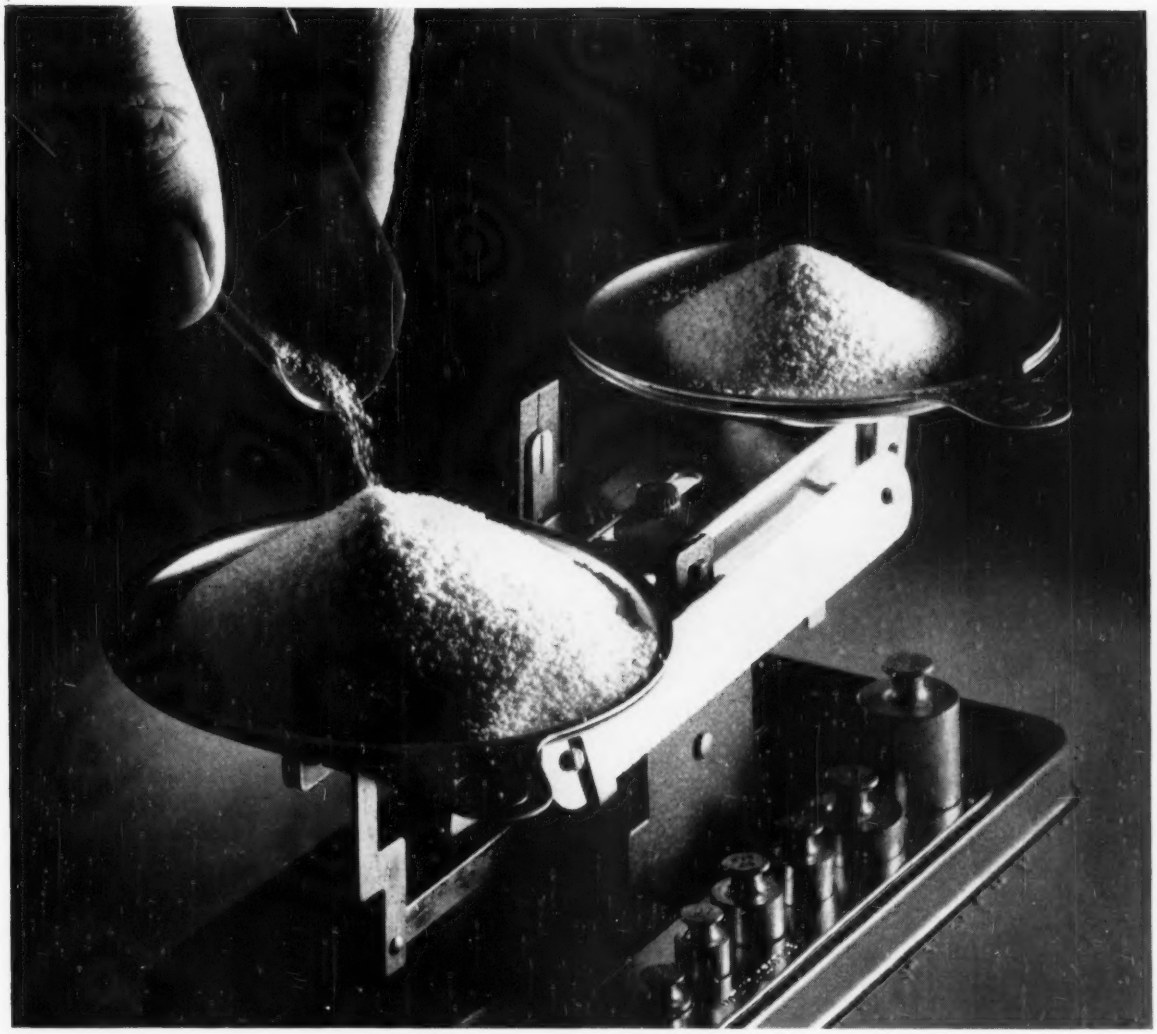
NCA Vice-President W. R. Wood, president of Girdler Construction Div. of Chemetron Corp. (Louisville, Ky.), cited the steel industry's addition of 6 million tons of capacity last year as an example of how modernization pays off.

The increase was achieved largely by improving the efficiency of existing plants through greater use of oxygen and other new steelmaking techniques. And steel plant modernization is likely to continue as the shifts in raw materials and finished products necessitate equipment replacements—e.g., sintering plants to handle lower-grade ores, new mills to turn out wider sheet.

Cost Advantages: Despite generally rising costs, construction cost-cutting is possible, said Whyte. Basic wage rates are up, but labor is more readily available and productivity is running high, he pointed out. And not all equipment costs are rising—many items recently were reduced; pipe, valves, etc., remain about the same.

Power plant equipment costs are rising—but deliveries are fast and purchases aren't subject to price escalation. As a result, construction firms can get firm-price contracts; and they have been meeting construction schedules, or beating them by as much as two months.

With the pickup in business, predicted Whyte, equipment suppliers will likely firm up all their prices in a hurry. Even so, the return to normal can't come too fast to suit the engineering-construction companies.



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Shea sodium tripolyphosphate is 97% to 99% pure—highest in the industry. For more information on these spray-dried products or other Shea phosphates, write to the address below. Disodium phosphate, trisodium phosphate, sodium hexametaphosphate, and sodium tripolyphosphate are available in conventional density, granular form.

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MHI Sodium Borohydride-SWS is an effective agent for the reduction of carbonyl groups to alcohols. With most aldehydes and all ketones tested, good yields of alcohols resulted. The reduction reaction of aldehydes takes place faster than condensation or polymerization reactions which might be expected in the presence of strong caustic. This means that MHI Sodium Borohydride-SWS can be used to clean up small amounts of carbonyl and peroxides in organic products.

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Other suggested uses for MHI Sodium Borohydride-SWS include foaming plastics and silicates; bleaching and stabilizing wood pulps; and treating natural and synthetic textiles.

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Market Newsletter

CHEMICAL WEEK
January 24, 1959

Revitalization of the U.S. tartaric acid business—which has all but withered into nonexistence during the past decade—is tied to President Eisenhower's approval of a Tariff Commission recommendation that tartaric acid and cream of tartar import duties be boosted substantially.

The proposal—on which the President has 60 days to act—would double the tartaric acid duty from the current 6¢/lb. to 12¢/lb.; the duty on cream of tartar would be hiked from the present 3⅛¢/lb. to 7½¢/-lb. Both new figures are the highest legal tariffs.

Presidential approval is not assured, of course. But the industry is pleading that failure to hike the tariffs could lead to total elimination of domestic production. The maximum allowable duty for the acid is more likely because the Tariff Commission unanimously recommended the increase for the acid; for cream of tartar, the vote was 3 to 2.

Stauffer Chemical stands to gain most from the proposed tariff hike. Its Brooklyn, N. Y., plant has been closed down for the past six months, and all sales have been made from large inventories. It's a good bet that Stauffer's plant would reopen soon after Presidential approval of the tariff proposal, but company spokesmen say it's premature to make a specific comment about their plans at this time.

On the other hand, it's unlikely that Pfizer—a former producer that now imports large quantities of tartaric acid and cream of tartar for sale in he U.S. (*CW Market Newsletter, Jan. 3*)—will be interested in resuming domestic production of these materials. Reason: Pfizer's tartaric purchases from Spain and Italy (where about 90% of all imported material originates) are calculated to aid the company to set up its own international organization in those countries.

•

Recent price reductions on polyvinyl acetate emulsions (*CW Market Newsletter, Jan. 3*) have cut deep into profits of nonbasic producers. Immediate effect has been to limit smaller companies' sales to local markets, since most are now unable to offer liberal freight equalizations to outlying districts.

In an attempt to improve their position, harassed PVAc producers are begging monomer producers to lower their prices but are getting little or no sympathy. Monomer makers argue that the present situation is outside their control and price concessions now wouldn't change the underlying character of the PVAc emulsion market.

And while PVAc prices decline, capacity climbs. Morningstar-Paisley, for example, will start producing polyvinyl acetate emulsion in about one month at Clifton, N.J. A doubling of the Clifton plant's capacity—it also produces liquid vinyl chloride and natural and synthetic latex compounds—boosts the firm's PVAc capacity by one-third. Here-

tofore, the company's PVAc production was carried on only at its Chicago plant.

Construction of a "fully automated chemical production unit" at B. F. Goodrich Chemical's Calvert City, Ky., plant is interpreted by trade observers as a tipoff to a forthcoming expansion of vinyl chloride monomer capacity by the firm.

Monsanto is already installing its RW 300 equipment into existing facilities, but Goodrich is claiming a first in installation of a digital computer control in a brand-new plant.

Meanwhile, overseas vinyl markets are being reshuffled. The Japan Vinyl Chloride Assn.'s attempts to create a price cartel (*CW, Nov. 29, '58, p. 25*) have been successful. Although the Japanese government had already authorized cartelization of production and shipment, it hedged on setting up of a proposed price trust. But approval on this point, too, was won by the association and a price cartel on Japanese-made vinyl chloride sets kilogram prices at 32¢ wholesale and 33¢ retail, effective between Dec. 27 and March 31. The government decision is expected to help 13 major producers clear their high inventories.

•

The bulk price of rubber-grade styrene monomer is shaved 0.7¢/lb., to 12¢/lb., by Monsanto. Primary reason for the cut, effective April 1, is completion of the firm's 40-million-lbs./year capacity increase at Texas City, Tex., which was accomplished through process streamlining and addition of new equipment. Contributing to lower styrene monomer tabs, says Monsanto, is current low cost of benzene.

•

Chlorosulfonic acid capacity has also been boosted by Monsanto, but spokesmen won't say how much more product can now be turned out at the William Krummrich plant at Monsanto, Ill. The acid is sold principally to makers of detergents, pharmaceuticals and agricultural chemicals.

•

Another name is added to the expanding list of synthetic fibers as Dow Chemical starts marketing its newly developed vinylidene chloride copolymer filament yarn, trademarked Rovana. It's available in 300-, 400-, and 550-denier, is expected to find its main initial uses in the auto industry.

SELECTED PRICE CHANGES — WEEK ENDING JANUARY 19, 1959

	Change	New Price
UP		
Amyris oil, dms.	$0.10	$1.35
Soybean oil, crude, tanks	0.00125	0.09625
Tin (Straits)	0.00125	0.99125
DOWN		
Albumin egg, flake, bbls.	0.02	1.05
Dodecylbenzene, dms.	0.003	0.137
Copra, ton	2.00	2.48

All prices per pound unless quantity is quoted.

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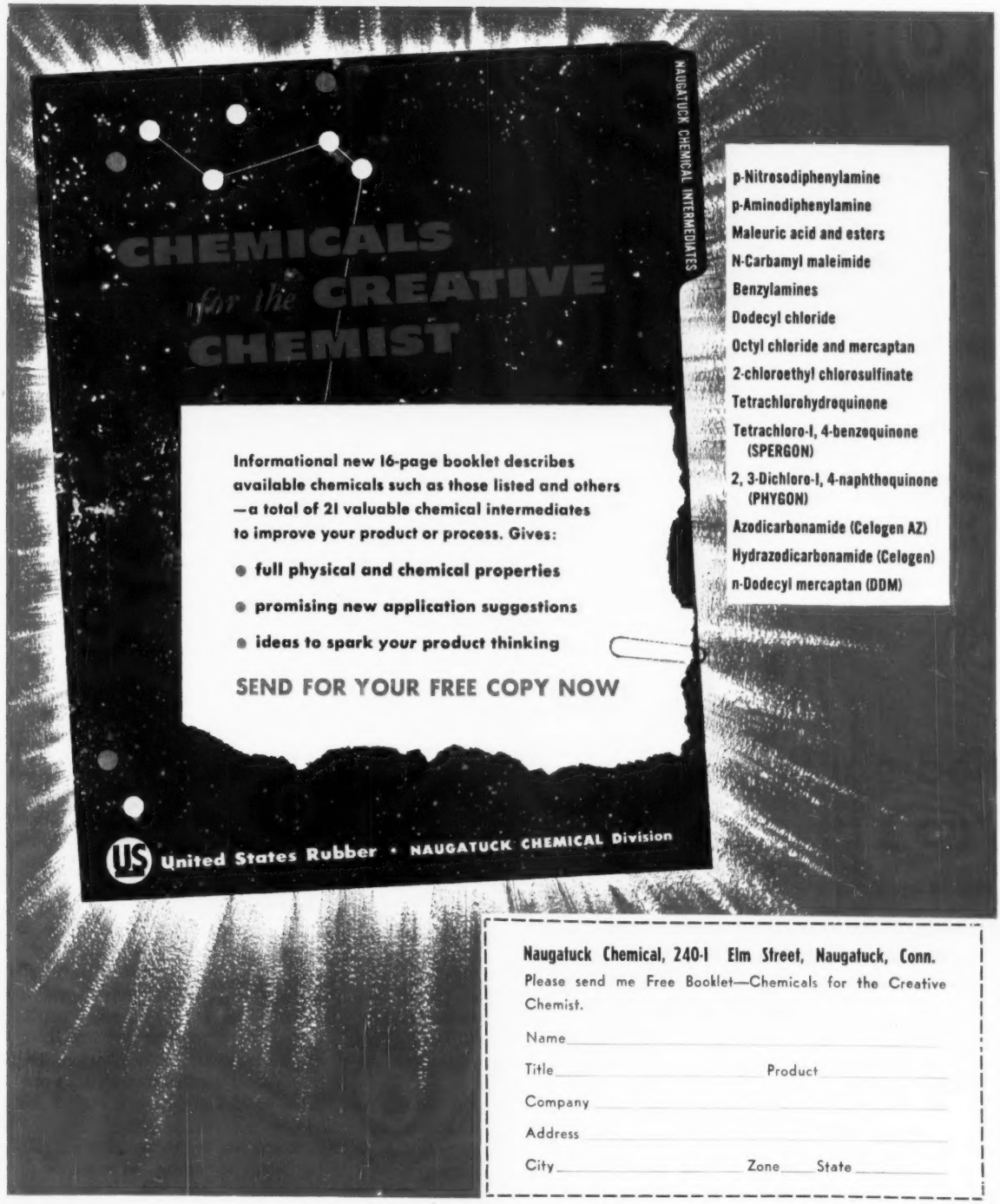
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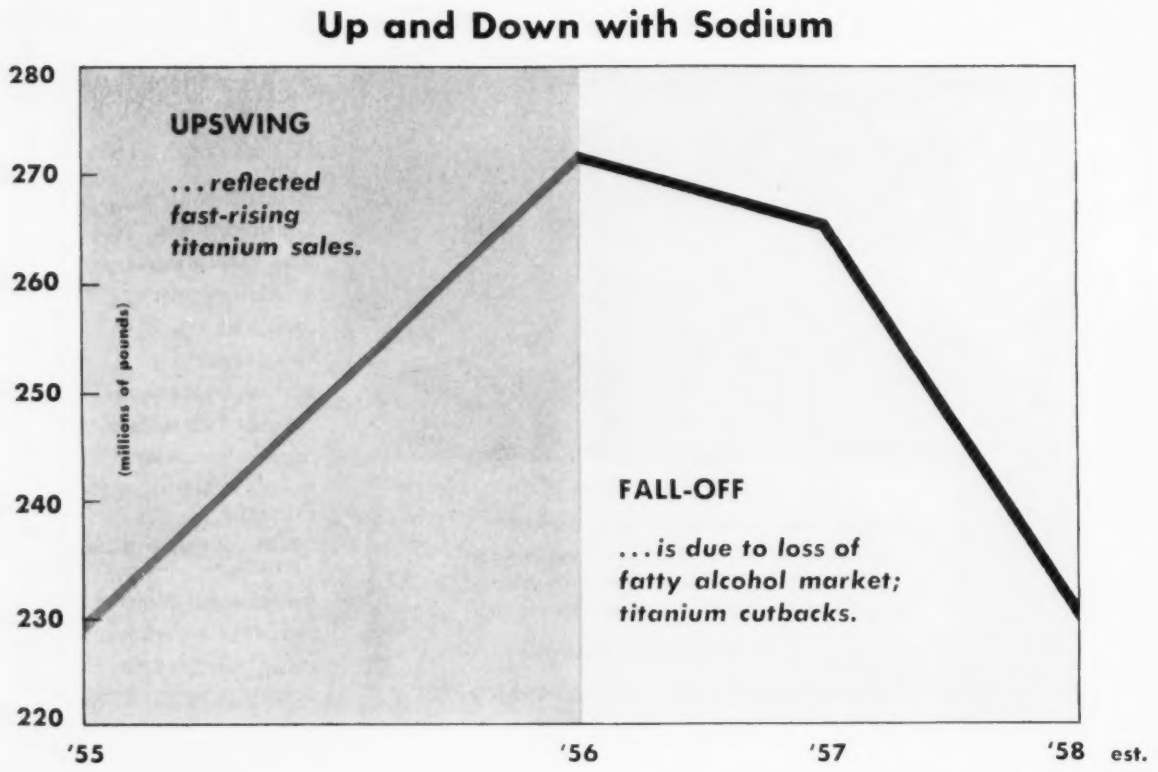

Source: Dept. of Commerce

Sodium Pins Large Hopes on the Long Pull

Production of sodium metal today is running some 30-35% behind U.S. capacity. And, since no great upswing is expected this year, the gap is slated to widen further when Du Pont comes in with a new, 45-million-lbs./year plant at Memphis, Tenn., sometime this month.

The new installation—plus recent expansions by other producers—will boost total capacity to approximately 400 million lbs./year. Indicative of the serious plight the industry is in: output in '58 was only a shade higher than 233 million lbs.

In the Offing: The big question that will be plaguing marketing men in the next few years: "How to increase consumption?" Several developments brighten sodium's long-range outlook. These include such uses as:

- Production of dibasic acids.*
- Reduction of atomic-age metals, such as titanium, zirconium, hafnium.
- Starting material for intermediates used in the preparation of high-energy fuels.
- Heat-transfer medium for atomic reactors and commercial applications.

*Most important now is USI's sebacic acid and Isosebacic; the firm is also researching and piloting other dibasic acids.

Tetraethyl lead is expected to remain the largest outlet for sodium over the next few years and will likely continue its normal growth of 3-6%/-year. Other end-uses will remain essentially the same.

Dibasic Boost: One of the more immediate developments affecting sodium is the announced startup of U.S. Industrial Chemicals' multistep dibasic acid plant at Tuscola, Ill., expected to be onstream within the next two or three months. Capacity will be about 15 million lbs./year, but facilities are available to produce twice that amount.

The new plant will turn out both sebacic acid and Isosebacic—10 million lbs. of Isosebacic and 5 million lbs. of sebacic acids. Sodium requirements are expected to be 4-5 million lbs./year, double that amount as the plant expands.

USI reports its dibasic acid program has already been turned over to the sales force, and orders for both truck- and carload quantities have been received. Major use for these products is as plasticizers, in polyurethanes, alkyd resins and molding nylon. The new plant is another part of USI's program to develop captive outlets for sodium.

Slowdown in Metals: During '57, the use of sodium in the reduction of atomic-age metals, particularly, titanium, was starting to assume major proportions. Estimates vary, but it is reported that as much as 36-40 million lbs. were consumed in this end-use. Military cutbacks in manned aircraft during '58—a big outlet for titanium—followed by cancellation of govern-

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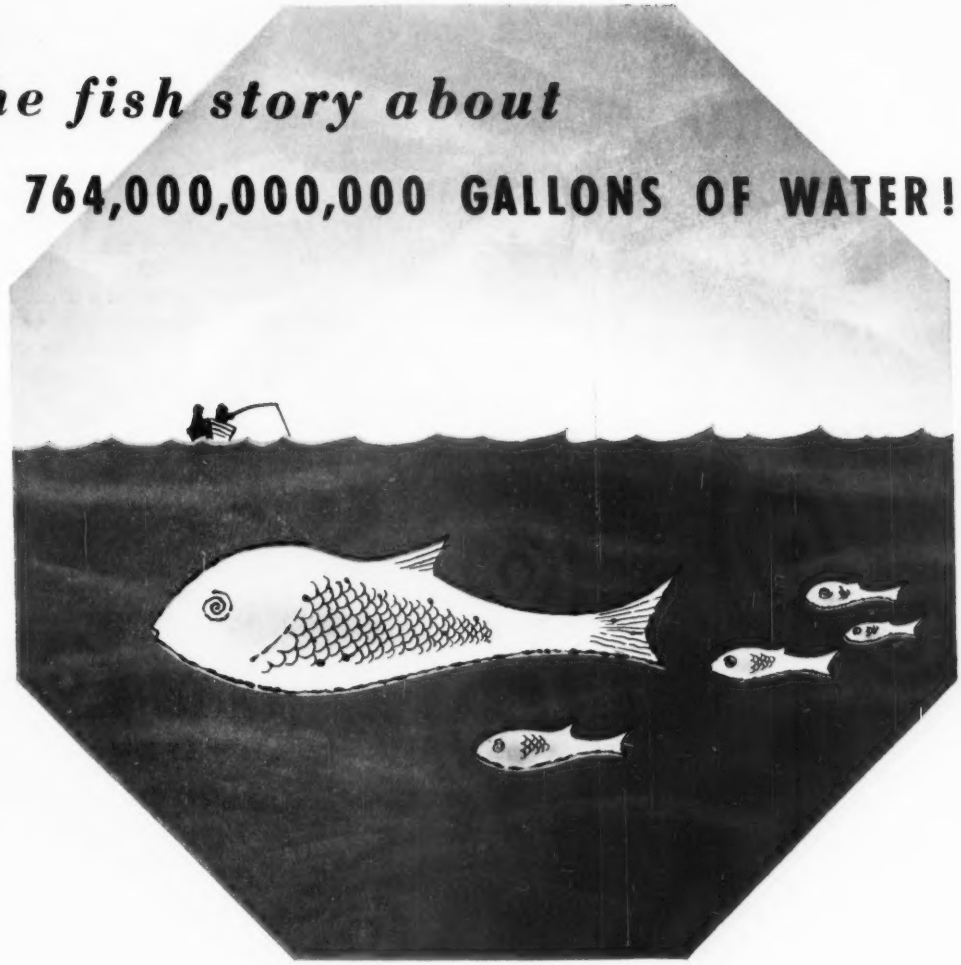

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ment contracts, reduced this figure to about 9-10 million lbs. The government is also the largest consumer of zirconium, which is used in nuclear reactors. Because of the uncertainty of the government markets, manufacturers of these metals are now turning more attention to private industry outlets (*see also p. 32*).

Two of the big stumbling blocks to the commercial use of these materials are the high price of the metal and high fabrication costs. The major difficulty is due to the ease with which these metals pick up gases, which seriously impairs their physical properties. Manufacturers are counting on new technology in this field to reduce costs and thereby put these metals on a competitive basis with other materials of construction. It is generally agreed that sodium sales will rise as production of these metals increases, because at present the use of the sodium process is more economical.

Space Makes a Market: Another potential market that will receive a lot of attention in the next couple of years is high-energy fuels. Sodium's use in this application is in the preparation of sodium borohydride, an intermediate in the preparation of alkyl boranes (*CW, July 20, '57, p. 35*). Several plants are now using this intermediate in the production of this type of high-energy fuel (*CW, May 17, '58, p. 23*). Another plant, Callery Chemical's $38-million plant for the Navy, at Muskogee, Okla., is due onstream this year.

But sodium is not the only metal being considered for this use. Olin Mathieson is investigating another synthesis in which lithium replaces sodium as the starting material. OM will study the lithium approach at its $45-million plant at Model City, N.Y.

Big question now: Which material will get the nod? Observers believe the market will be several million pounds, providing this phase of the high-energy-fuel program gets off the ground.

. . . And So Does the Atom: In the nuclear reactor program, sodium is receiving more than casual attention, particularly in the fast-breeder type of reactors. (A fast-breeder reactor is one that produces more fuel than it consumes.) To date, these reactors are designed to use sodium as the coolant. By '60, four experimental types of reactors using sodium will go critical, including the Enrico Fermi fast breeder at Monroe, Mich. These projects are designed to obtain engineering data on the various types of reactors. If sodium proves itself, the amount involved might be considerable. These are one-shot deals, since replacements are negligible.

AEC has awarded contracts for the study of sodium as a coolant in major nonnuclear components such as heat exchangers and steam generators. Another AEC study concerns the use of radioactive sodium coolants as a source of high-level radiation for use in industrial processes. Major advantage: the radiation would be constant, since sodium is being recycled through the reactor.

Dashed Hopes: The reason for the industry's overexpansion is believed to stem from three factors at work during 1956-58:

(1) Titanium production was soaring. Union Carbide Metals' plant at Ashtabula, O., was running at near capacity; USI had started building its own titanium plant, which would use sodium; Allied-Kennecott Copper had announced plans—later abandoned—for a $40-million integrated titanium plant.

(2) The trend in Detroit was toward higher-compression engines, requiring higher-octane gasolines. The demand for TEL—still the most economical way to raise the octane of gasoline—was expected to increase substantially. About this time, both Du Pont and Ethyl were putting up plants in California to fill TEL requirements on the West Coast—Du Pont at Antioch, Ethyl at Pittsburg.

(3) Production in '56 had hit an all-time high of 272.0 million lbs., which was 90% of that year's capacity.

These factors, working together,

Estimated Sodium End-Use Pattern

(million pounds)

	1953	1958	1959
Tetraethyl lead	137.0	165.0	170.0
Sodium cyanide	45.0	26.0	26.0
Ester reduction	50.0	0.5	0.5
Sodium peroxide	10.0	16.0	16.0
Metal reduction	—	11.0	11.0
Miscellaneous (hydride descaling, drugs, dyes etc.)	8.0	14.0	14.0

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caused observers to expect increased demands for sodium. These expected pressures on capacity led Ethyl and USI to increase existing plant capacities, and Du Pont started plans for a new plant. When the titanium picture changed in '58, the industry was left with dwindling sales and higher output potential.

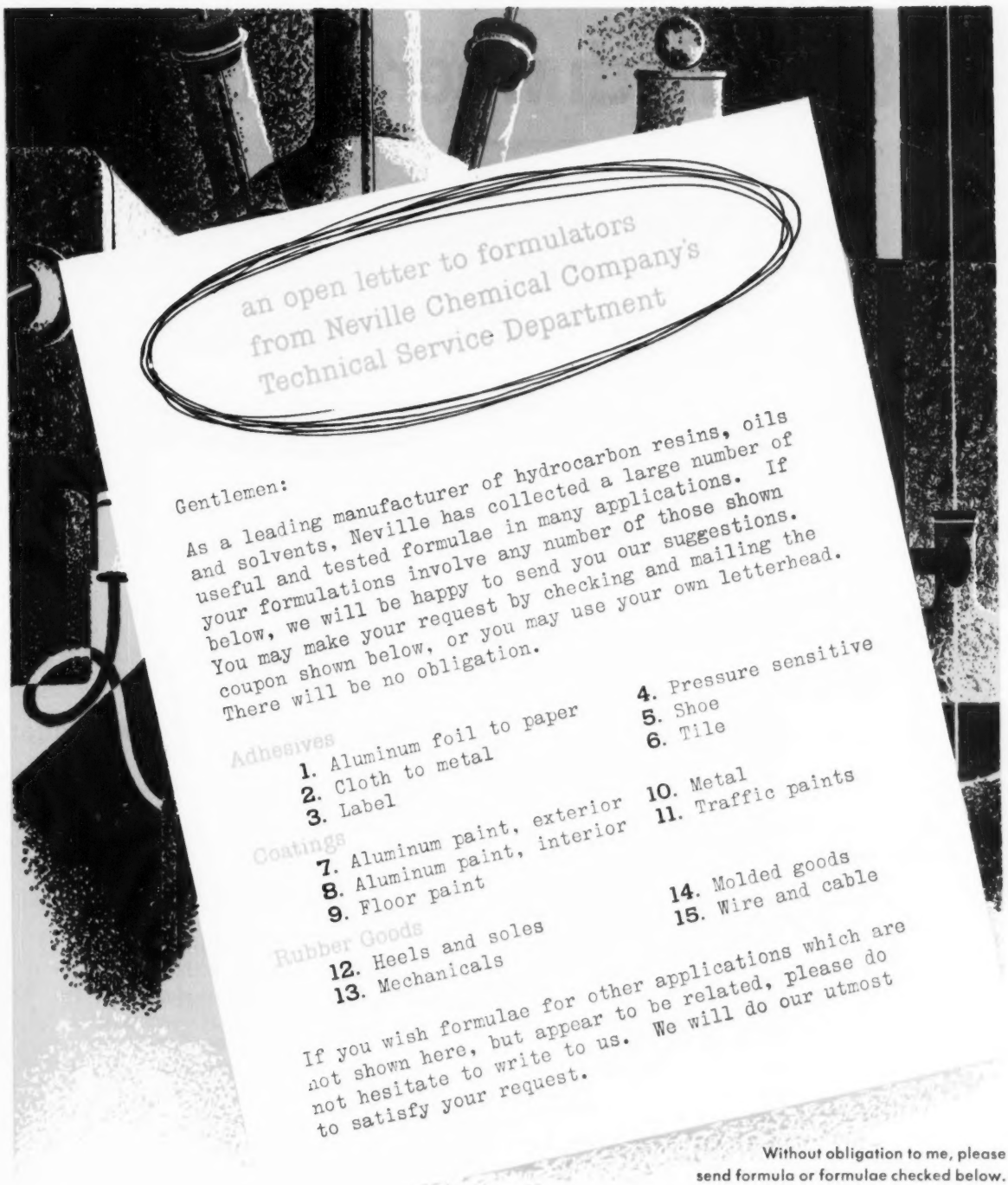
Another factor that widened the capacity-production gap was the deterioration of the fatty alcohols market. In '56, over 40 million lbs. of sodium were consumed in this application. With the switch to direct hydrogenation by Procter & Gamble during late '57 and early '58, the market fell off to a relatively insignificant 500,000 lbs.

Silver Lining? The problem of overcapacity will continue for several years. Producers, who have been using sodium mostly for captive use, will be concentrating more on encouraging industry's acceptance of the metal in large-scale processes. To accomplish this, more effort will be put into research to find new uses, and into commercial development work to persuade manufacturers to use sodium instead of alternate materials in their processes and their products.

Next Week, CW Report

STEROIDS

A close look at the busiest corner of the pharmaceutical industry. Last year, steroid hormones brought in $120 million in sales (at the manufacturers' level), third place among ethical drug groups. Backed by a vigorous program of research, production and clinical testing, steroids have set their sights on the top spot in drug sales.



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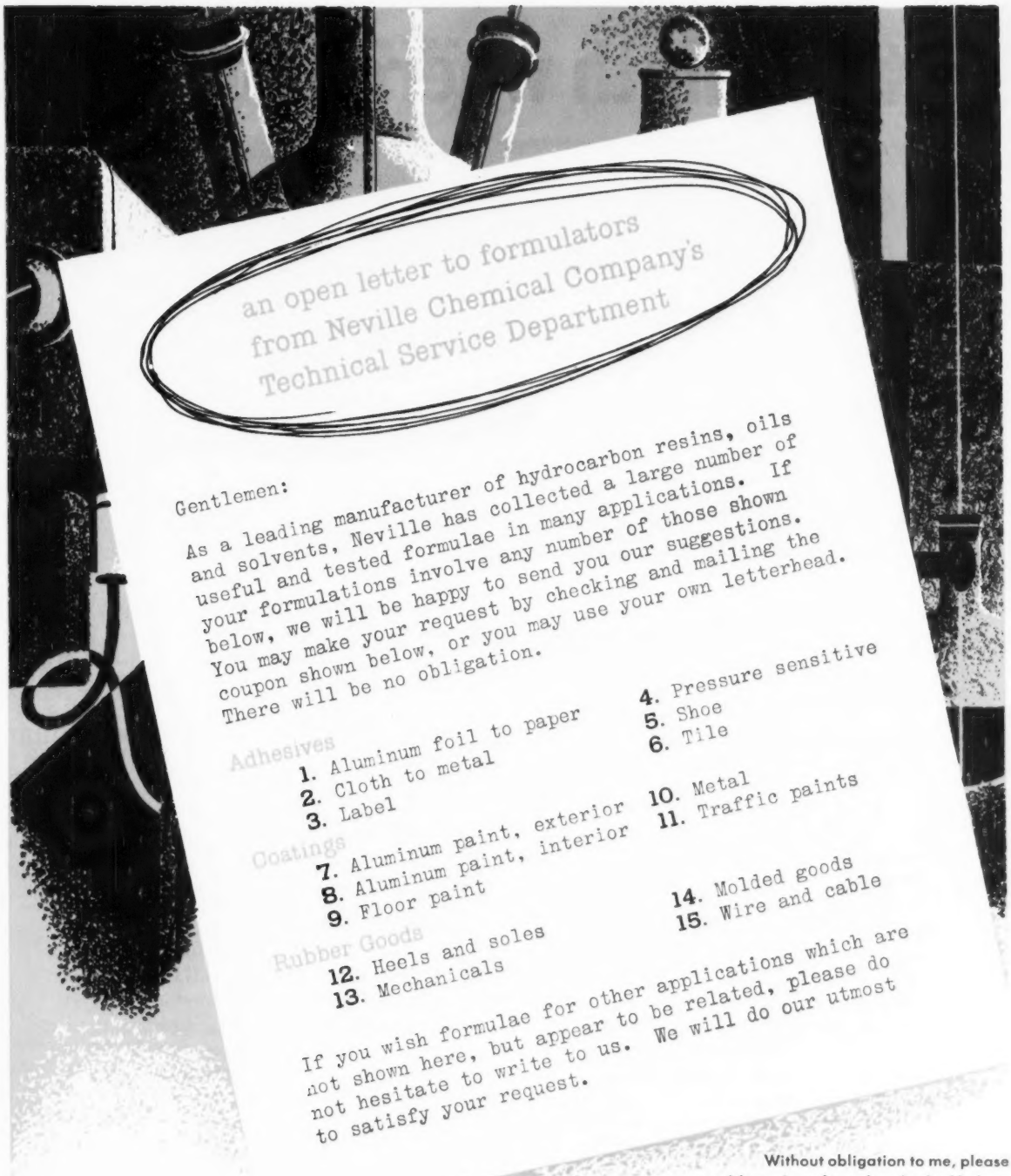

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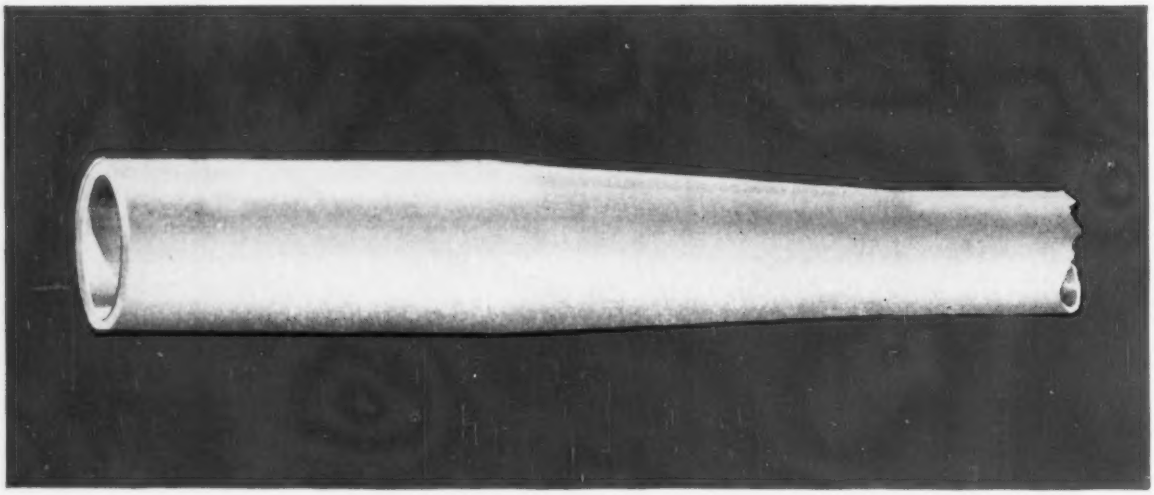

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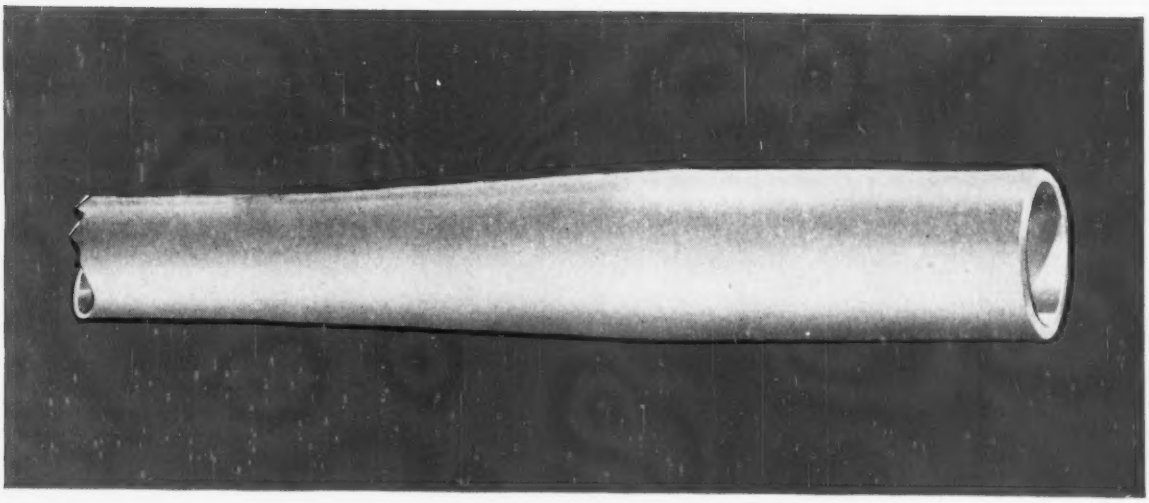

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Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Pounds
3	3.500	.300	2.900	10	3.150	.200	2.750	2.29
3½	4.000	.318	3.364	10	3.642	.214	3.214	2.84
4	4.500	.337	3.826	11	4.140	.232	3.676	3.57
5	5.563	.375	4.813	11	5.185	.261	4.663	4.98
6	6.625	.432	5.761	12	6.217	.303	5.611	6.95
8	8.625	.500	7.625	12	8.183	.354	7.475	10.68
10	10.750	.593	9.564	13	10.260	.423	9.414	15.65

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(2) Based on 40 ft. length

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	Ultimate Bursting Pressures	Working Pressures Factor of Safety 3	4	5	Ultimate Bursting Pressure	Working Pressures Factor of Safety 3	4	5
Inches	psi	psi	psi	psi	psi	psi	psi	psi
3	5150	1720	1290	1030	3680	1220	920	740
3½	4750	1580	1190	950	3400	1130	850	680
4	4460	1490	1110	890	3180	1060	790	640
5	3990	1330	1000	800	2850	950	710	570
6	3850	1280	960	770	2760	920	690	550
8	3410	1140	850	680	2430	810	610	490
10	3240	1080	810	650	2310	770	580	460

Schedule 40 Equivalent

Nominal Size	Major (Heavy End) O. D.	Major (Heavy End) Wall	Heavy End I. D.	Heavy(1) End Length	Minor Body O. D.	Minor Body Wall	Minor Body I. D.	Average(2) Weight Per Ft.
Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Pounds
3	3.500	.216	3.068	10	3.214	.148	2.918	1.76
3½	4.000	.226	3.548	10	3.724	.163	3.398	2.22
4	4.500	.237	4.026	11	4.218	.171	3.876	2.64
5	5.563	.258	5.047	11	5.259	.181	4.897	3.53
6	6.625	.280	6.065	12	6.311	.198	5.915	4.66
8	8.625	.322	7.981	12	8.291	.230	7.831	7.12
10	10.750	.365	10.020	13	10.388	.259	9.870	10.16

(1) Length of heavy end wall thickness exclusive of transition zone
(2) Based on 40 ft. length

Nominal Size	6061-T6, 6062-T6 Alloy				6063-T6 Alloy			
	Ultimate Bursting Pressures	Working Pressures Factor of Safety 3	4	5	Ultimate Bursting Pressures	Working Pressures Factor of Safety 3	4	5
Inches	psi	psi	psi	psi	psi	psi	psi	psi
3	3640	1210	910	710	2600	860	650	520
3½	3450	1150	860	690	2365	790	590	470
4	3070	1020	760	610	2195	730	550	440
5	2690	890	670	540	1925	640	480	380
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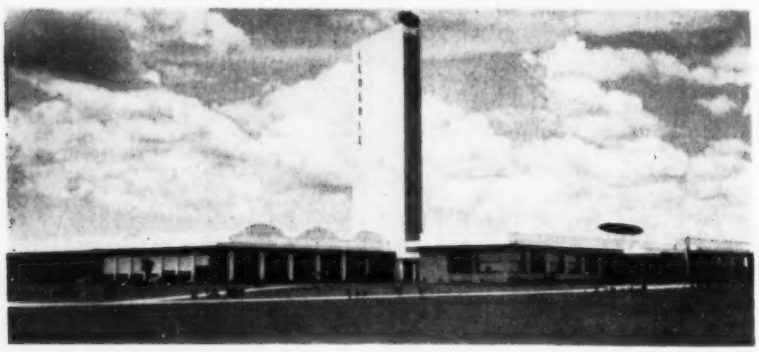
Cyanamid's Bliss: "There's no advantage to imposing rigid operating principles on our wholly owned foreign subsidiaries. Instead, we promote "guided autonomy" in plants such as our new one in Argentina (below)."



"Guided autonomy," says American Cyanamid's Harry Bliss, director of operations for that company's International Division, is the key to Cyanamid's policy for dealing with its wholly owned overseas manufacturing plants and subsidiaries. This policy suggests a way other U.S. chemical process firms may enjoy the benefits of foreign enterprise and at the same time improve overseas business relations.

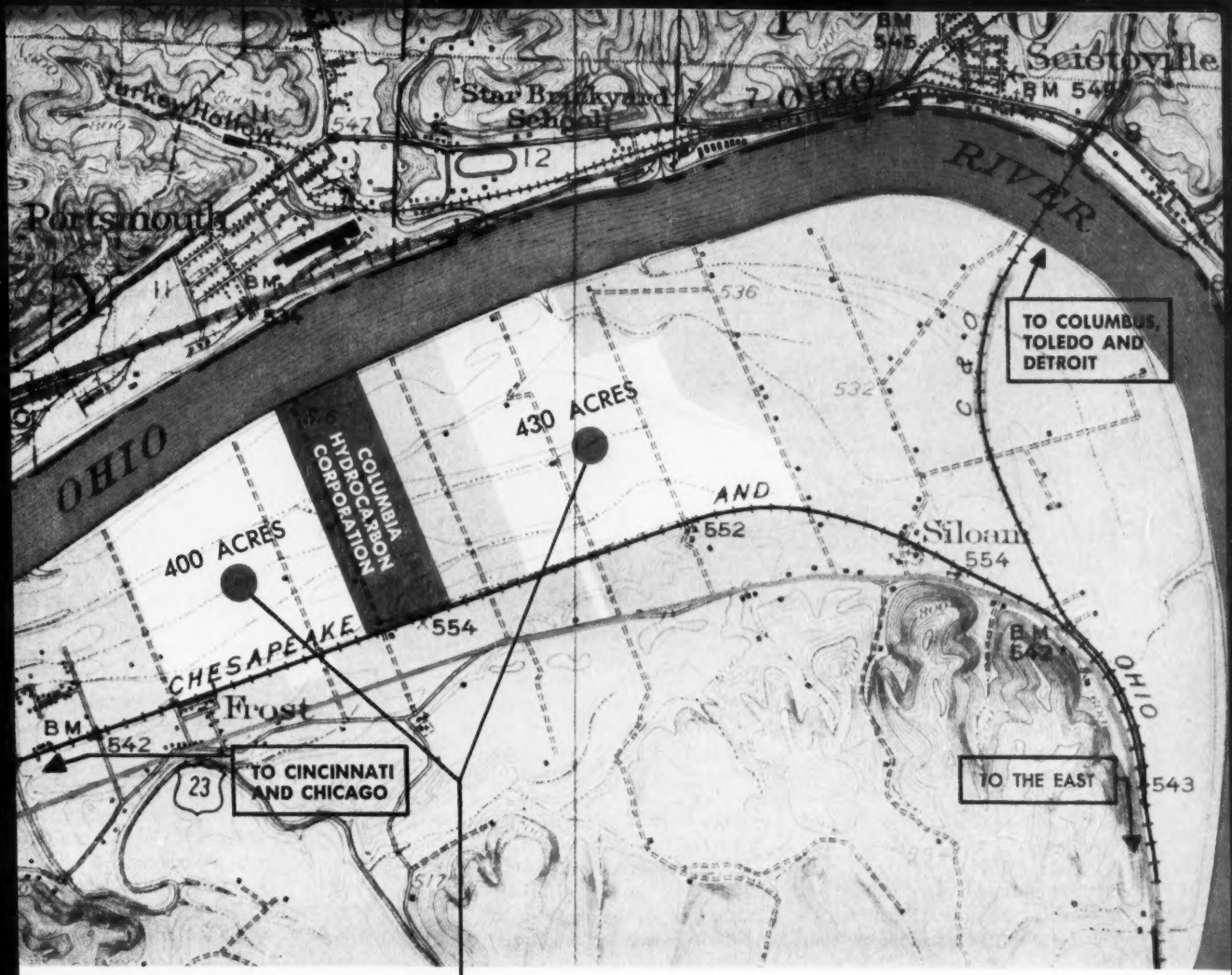
The policy is alien to most process companies—it leaves day-to-day management of wholly owned foreign operations solely in the hands of nationals.

In only a year of operation, Bliss last week told *CW*, Cyanamid's International Division has added three units to its list of thriving operations. It has directed the startup of two South American plants (including a pharmaceutical unit at Buenos Aires, Argentina, *lower left*), completed additions to a third plant in Mexico and witnessed the growth of proceeds from overseas business to a substantial 15% of total company sales ($532.5 million in '57).

Mutual Advantages: Cyanamid feels that completely staffing foreign operations with local management personnel — including the subsidiary's top position — ensures a smoother operation. Primarily, the advantages stem from management's knowing the local working force, business and political climate—it can get things done, where foreigners fail. In addition, the policy adds greater incentive to local executives by removing limitations to advancement. "They don't see an American sitting in the top spot," Bliss says.

Cyanamid backs up its "guided autonomy" policy by not forcing the subsidiary to use preconceived home-office ideas on how to operate. "We let local business and political conditions dictate to local management how business is to be conducted," Bliss explains.

"Naturally," he continues, "the subsidiary practices its autonomy consistent with established policies of the parent company and within financial (budgets, etc.) and legal (licensing,



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Cyanamid's Babcock, Knee study results of 'guided autonomy.'

trademarks, employee benefits, etc.) limitations defined by headquarters in New York." It is in that sense that subsidiary autonomy is "guided."

How It Works: Briefly, here's how Cyanamid's policy works:

- Administration. The plant manager, who is responsible to the managing director of the subsidiary, handles administration of the plant. There is no direct relationship between the overseas plant manager and the home office. Executives of the International Division, however, serve as officers and directors of the subsidiaries.
- Finance. Prices are set by local management after consultation with the parent company. Capital-expenditure requests are made by local management to the New York office. Salary levels and plant operating costs also are handled by local executives.
- Marketing and sales. Cyanamid International coordinates marketing and sales functions of all the company's foreign operations. Plant and sales managers are responsible to the subsidiary managing director.

Headquarters Staff: Providing this guidance is Cyanamid International's close-knit, functionally oriented headquarters staff. This group deals with wholly owned manufacturing subsidiaries in England, India, Australia, South Africa, Argentina, Brazil and Mexico, its associated companies in Japan and Holland, and its nonmanufacturing subsidiaries in West Germany, Belgium and Pakistan.

Headed by Sidney Moody, Cyanamid vice-president, the division includes directors of operations, marketing and finance and administration. Operations, directed by Bliss, are handled by four departments: production, engineering, medical research and agricultural technology.

The production department is headed by Sidney Babcock (*above, left*). This group assists in the selection and training of foreign plant production managers, tackles major problems.

The engineering department, headed by Raymond Knee (*above, right*), supervises the construction of overseas plants, selects and trains plant engineers.

In setting up foreign plants, parent company interference is minimized. Whenever possible, local workmen, materials and construction supervision are used. The parent company requires only that the plant (designed by local architects) be a pleasant place to work, safe, pleasing to look at and functional.

Future Prospects: Cyanamid will continue to expand its overseas manufacturing facilities. Says Bliss: "Like everyone else we know, we feel that the 'Common Market' and similar, proposed regional economic blocs will require local production, if we are to sell abroad. If we don't produce overseas, someone else will.

"We plan to expand overseas as fast as economics and other factors permit, not only in pharmaceuticals (all but one of its seven wholly owned foreign plants manufacture pharmaceuticals) but also in general chemicals and specialties."

Community Booster

A CPI executive last week came to grips with a situation the government, he charges, has failed to evaluate—the important area of business climate along the Niagara frontier. Clinton Robinson, president of The Carborundum Co., reported the appointment of a "Business Climate Appraisal Committee" to conduct a systematic, unbiased and detailed survey of the community.

Robinson has been an outspoken critic of efforts of New York state officials, particularly in the Niagara area, to improve business conditions locally and, statewide, to encourage expansions and attract industry. Now he has organized the committee to appraise state and national influences affecting the cost and ease of operating businesses in the Niagara vicinity. Chairman of the committee is William Wendel, group vice-president of Carborundum.

Among other things the committee will look into: cultural and educational opportunities; community facilities and activities; industrial citizenship; community planning and administration of public affairs; labor-management relations; comparative labor costs; availability of qualified personnel.

Robinson says the appraisal is being initiated by Carborundum as a public service and will be made available to the community for study and action.

Improving the business climate was an important point in the platform

Carborundum's Robinson comes to grips with community problem.

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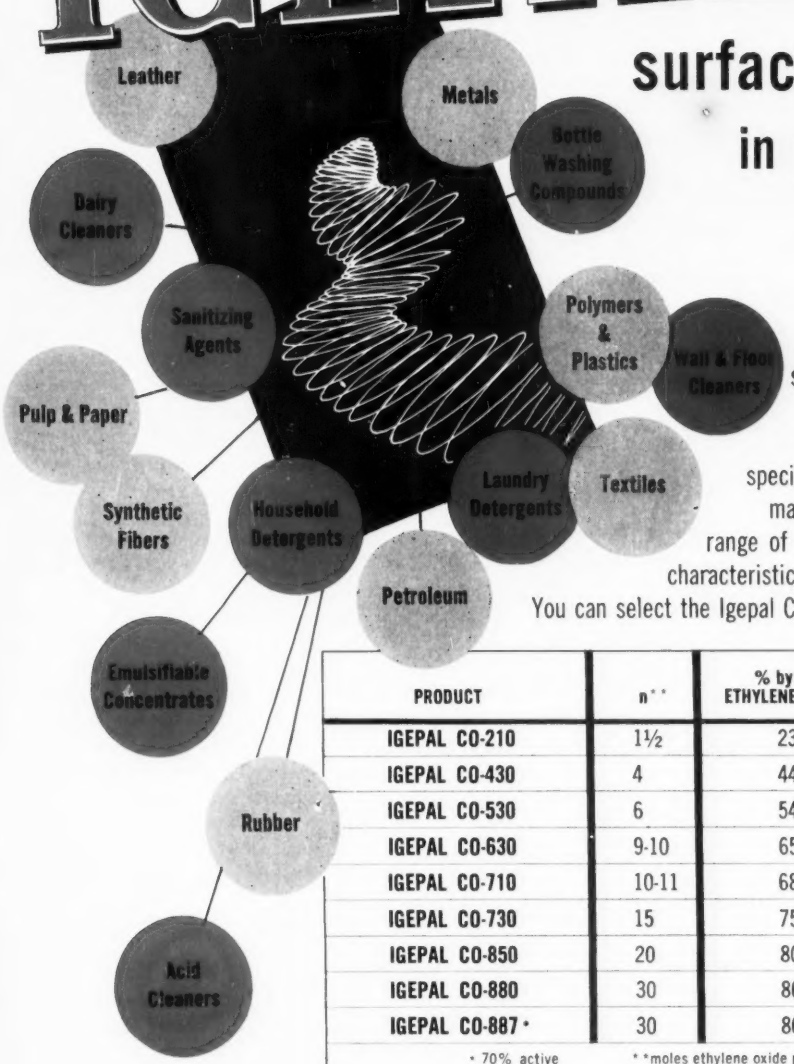

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of New York's new governor, Nelson Rockefeller. Many business groups, including the Associated Industries of New York State, have shown deep concern for the business environment in the state.

Carborundum has already had some experience in coping with the problem. Last July, it successfully concluded negotiations with a labor union enabling it to expand Niagara facilities instead of building a new plant elsewhere.

Uniting Labor Front

The merger-minded chemical unions last week jarred complacent skeptics who question the sincerity of their amalgamation negotiations. Moving closer to the merger goal, four top officers of Oil, Chemical & Atomic Workers and International Chemical Workers Union met in Cleveland as a committee to review "the similarities and differences in organization structure of our two international unions."

According to a joint statement by OCAW President O. A. Knight and ICWU President Walter Mitchell, the committee also exchanged ideas as to what possible constitutional structure could best serve the needs of a merged organization. "As a result of our talks," they said, "we are now proceeding to draw up a number of written proposals that will be studied at a later meeting of our committee."

That meeting, according to a union spokesman, should be sometime soon, since the larger, 40-member joint merger committee appointed at last year's union conventions will meet early next spring.

•

Bargaining Plans: International Chemical Workers Union will hold an unprecedented four-day meeting in the Florida phosphate fields next week.

The meeting will be divided into two parts. The first will be a two-day closed bargaining-planning session; the second will be a two-day open meeting of panels and talks to which legislators, county officials and the public will be invited to hear union views on air pollution and health hazards. Likely points to be made: the union feels that harmful dusts and fluorides in the air are still too prevalent; employers should keep more extensive individual health records on employees; broadening of Florida's workmen's compensation law is necessary to give greater coverage to phosphate workers.

KEY CHANGES

Robert L. Kob to vice-president, B. T. Babbitt (New York).

C. Walter Buhler to president and board chairman, **Howard S. Tuthill** and **William W. Rohrbach** to directors, A. S. Harrison Co. (South Norwalk, Conn.).

Ulrich Reimer to vice-president and director of research, **Silas Kompelien** to vice-president and treasurer, **Bill Schaaf** to general sales manager, Fremont Industries (Minneapolis).

Richard C. Wells to executive vice-president, Freeport Sulphur Co. (New York).

Keith E. Hall and **Alfred H. Williams, Jr.,** to vice-presidents, Reynolds Aluminum Sales Co. (Richmond, Va.).

Theodore S. Hodgins and **John J. Levenson, Jr.,** to directors, Wilson Organic Chemicals (Sayreville, N.J.).

Harry C. Wechsler to vice-president; **Judson S. Bryant** to controller, international operations; Borden Chemical Co. (New York).

J. Clifford Knochel to vice-president, American-Marietta (Chicago).

Frank B. Jewett, Jr., to executive vice-president; **William B. Hall,** to vice-president; Vitro Corp. of America (New York).

Thomas B. Nantz to vice-president of manufacturing, B. F. Goodrich Chemical Co. (Cleveland).

Albert J. Royce, Sr., to board chairman and chief executive officer; **Albert J. Royce, Jr.,** to president; **Howard C. Royce** to executive vice-president; Royce Chemical Co. (Carlton Hill, N.J.).

Edmund W. Littlefield to director, W. P. Fuller & Co. (San Francisco).

Bruce S. Shannon to financial vice-president, **Fred Wilson** to vice-president — manufacturing, **James A. Parchmann** to controller, Drackett Co. (Cincinnati).

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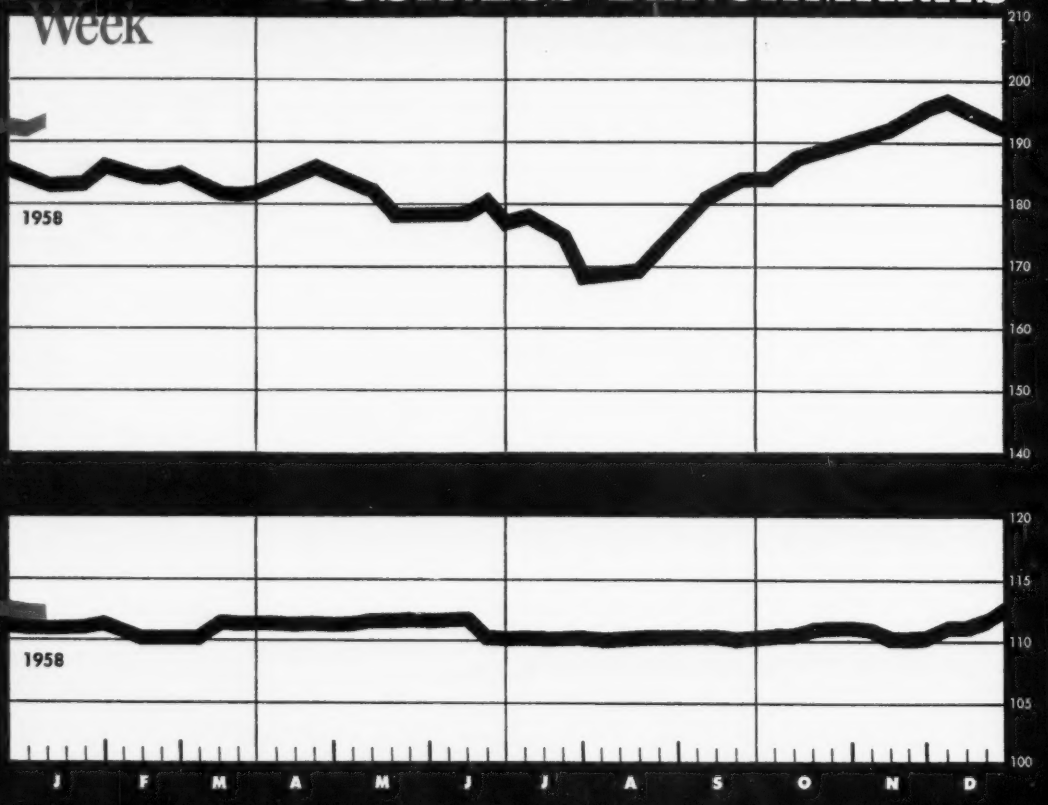

JANUARY 24, 1959

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1947-49=100)	194.0	192.5	185.5
Chemical Week wholesale price index (1947=100)	111.9	111.9	111.2
Stock price index (11 firms, Standard & Poor's)	49.40	48.57	40.51
Steel ingot production (thousand tons)	2,123	2,085	1,538
Crude oil and condensate (daily av., thousand bbls.)	7,052	7,122	6,850
MONTHLY INDICATORS—Wholesale Prices	**Latest Month**	**Preceding Month**	**Year Ago**
All commodities (other than farm and foods)	127.2	126.8	126.1
Chemicals and allied products	110.0	110.2	110.6
Industrial chemicals	123.7	123.6	123.9
Paint and paint materials	120.8	120.7	109.3
Drugs, pharmaceuticals and cosmetics	93.2	93.4	93.5
Fertilizer and materials	**105.3**	**105.2**	**107.8**

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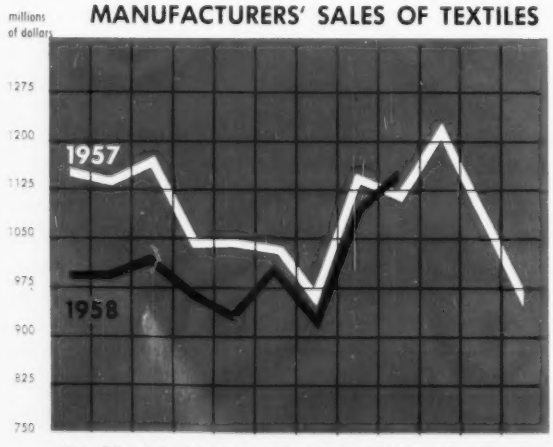

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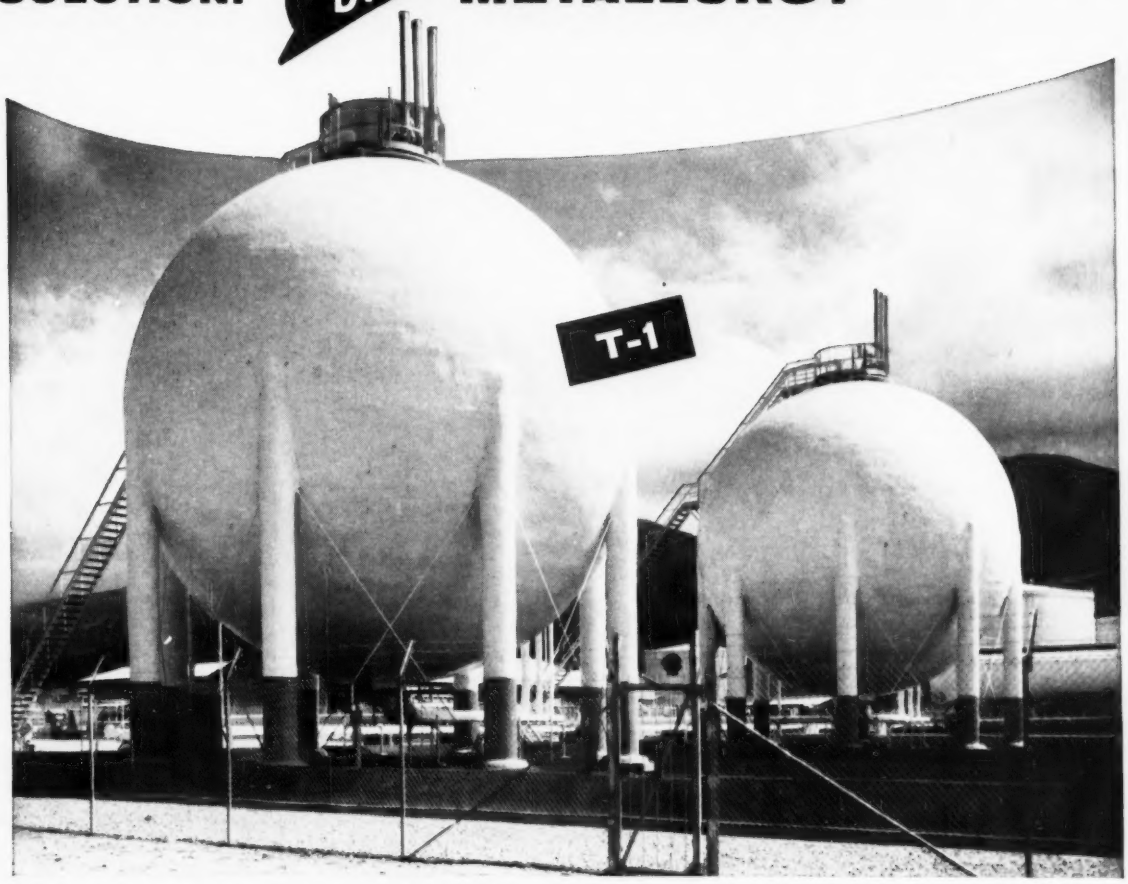
SOLUTION: METALLURGY



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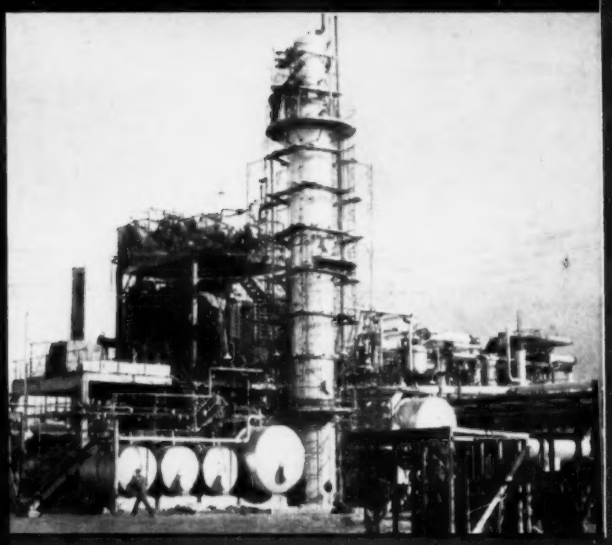
- Guaranteed construction completion date

This polyvinyl chloride plant, built for Cary Chemicals, Inc., is typical of the three PVC plants completed in 1957.



This phthalic anhydride plant for Witco Chemical Company is now under construction by SD Plants Incorporated. It will be placed on stream early this year.

SD PLANTS INCORPORATED

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